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THERMAL INSULATION OF AIR FORCE CLOTH

A CATALOG AND PART 5 OF A SERIES

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WRIGHT AIR DEVELOPMENT DIVISION

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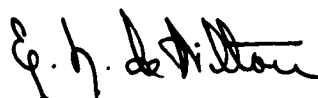
FOREWORD

This report was initiated under Project No. 7164, "Physiology of Flight," Task No. 71830, "Human Thermal Stress in Extended Environment," and administered under the direction of the Biomedical Laboratory, Aerospace Medical Division, Wright Air Development Division. This research effort was conducted in the Biothermal Section of the Biophysics Branch.

ABSTRACT

Results of the fifth of a series of thermal insulation studies performed with electrically heated hand, foot, head, and entire body models are presented. The experimental data include results obtained with light, medium, and heavy clothing types, as well as with thermal protective items of a specialized nature. A revised catalog listing individually the insulation in clo units of numerous recently developed clothing items is included. These are arranged in order of increasing value in each clothing category (i.e., light, medium, and heavy). Since catalog values were obtained either by separate measurement, or by a difference method, these two techniques for body clothing insulation measurement are described. Advantages and limitations of each respective method are discussed. Relationship between the measured and calculated thermal insulation of clothing assemblies is shown graphically and correction factors for use with each category of catalogued clothing are graphed. The effect of laundering on thermal insulation of many recent Air Force clothing assemblies is illustrated and discussed.

PUBLICATION REVIEW



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INTRODUCTION

Human exposure to thermal extremes and survival from emergency exposure to cold air or water is a constant problem in present Air Force operations. Within high performance aircraft or during re-entry periods within ballistic or hypersonic glide vehicles or spacecraft, high ambient temperatures far in excess of the comfort zone may frequently result. Furthermore, high altitude escape, cold water immersion, or prolonged survival under arctic conditions are specific problem areas requiring continuous development and evaluation of many types of specialized protective clothing.

An extensive amount of information concerning Air Force clothing has accumulated since the original catalog was published in 1956. The present report includes thermal insulation data obtained since that date and also contains a completely revised, up-to-date catalog in which all items are arranged in a convenient, logical form. The primary purpose of such a catalog is to permit simple yet accurate calculations of the insulative value of various clothing combinations. Properly used these calculations will provide realistic and valid predictions of human tolerance in various environmental conditions.

Comparative techniques used for thermal insulation measurements of body clothing are described in some detail since these data form the most substantial portion of the catalog. Experimental evidence demonstrating the relationship between the measured versus calculated (from catalog data) thermal insulation values is shown. The general usefulness of these catalogued values, as indicated graphically, appears well substantiated.

Proper maintenance of protective clothing is essential for functional effectiveness. The more recently developed synthetic fabric material (Dacron, Orlon, etc,) may be readily laundered by conventional washing methods, so insulation changes resulting from laundering had to be measured. The results of these studies are described in Section 4 and are plotted in figure 3.

METHODS

Methods routinely used since 1946 by this Laboratory for evaluating the thermal insulation of complete clothing assemblies, handgear, footgear, headgear, and other types of protective clothing were used in these studies. Details of the techniques devised for testing each type of clothing have been described in previous reports (refs. 1, 2, 3, 4). These emphasize the advantage of using physical models rather than human subjects for thermal insulation measurements and for screening purposes in clothing evaluation. We emphasize that the use of these physical models has definite limitations. Thermal insulation measurements with these models are based on radiative - conductive - convective heat transfer. Evaporative heat loss or vapor permeability of fabrics thus cannot be assessed with these physical models. However, for most Air Force thermal exposures where crewmembers are exposed to significant heat loads, thermal comfort or reasonable tolerance time is best achieved by using ventilated clothing. High vapor permeability of even the most effective clothing available to date fails to provide the evaporative heat loss required in thermal exposures of even a moderate stress level. Consequently measurements of clothing vapor permeability while valuable in overall clothing evaluations are not critical in assessing present Air Force flight or emergency protective clothing.

Physical methods for measuring thermal insulation on small samples of synthetic fibers, cotton, wool, and blends of these have been used previously (ref. 5) to select potential wool pile substitutes. Measurements of thermal insulation of various types of furs have also been reported (ref. 6). However, since both of these studies were performed only on a flat test surface, the factors of fit, entrapped air layers, compression resulting from overlying clothing, and the shape factor characteristic for an entire copper manikin, are lacking. These guarded hot plate methods while providing valuable selection or screening data thus fail to provide thermal insulation values as truly valid as those reported and cataloged in this report.

RESULTS

The results of these thermal insulation studies are presented in four sections. Section 1 lists test data completed on Air Force clothing items and on assemblies since the prior report (October 1956). Section 2 consists of an extended, revised clothing catalog arranged by type and in order on increasing clo* or insulation value. Section 3 compares several techniques used for measurement of the thermal insulation of body clothing. Limitations and advantages of each are discussed, and the relationship between the respective methods graphically shown. Section 4 discusses the effects of conventional laundering on thermal insulation of protective clothing and these results are shown graphically.

The individual catalog values were again based on either separate measurement or were derived by a difference method in the case of multi-layered or heavy insulation. These values, in view of results presented in Section 3, may be used to calculate validly either (a) by the total or mean effective clothing insulation as previously defined (ref. 4); or (b) by the sub-total or area clothing insulation used to cover certain surface areas only, i.e., head, or body (trunk, arms, and legs), hands, and feet. The correction factors presented thus permit a more accurate prediction of the actual or effective clothing insulation to be expected when various single items are combined in various types of clothing assemblies.

*Clo - Unit of insulation defined as the insulation necessary to maintain in comfort a sitting-resting subject in a normally ventilated room where air movement is 20 feet per minute, temperature is 70°F, and humidity is less than 50 percent.

SECTION 1

THERMAL INSULATION OF AIR FORCE CLOTHING

(Part 5 of a series)

TABLE 1

INSULATION TESTS OF LIGHT (BODY) CLOTHING (0.0 - 1.5 clo)

| TEST NO. | MODEL | \dot{Q}_b | $T_s - T_a$ | I |
|---|-------|-------------|--------------|---------------|
| ===== | | | | |
| (1) Thermistor Suit, Combed Cotton, (28-reg.) | | | | |
| 1 | 1 | 66.0 | 100.8 - 78.5 | 0.34 |
| 2 | 1 | 72.9 | 107.0 - 84.0 | 0.27 |
| 3 | 1 | 78.5 | 108.5 - 84.0 | 0.26 |
| | | | | Average: 0.30 |
| | | | | ±0.04 |
| | | | | ±13% |
| (2) Two-piece Allen-A Insulaire Thermal Underwear (Size 7) (after 10 washings) | | | | |
| 1 | 1 | 98.1 | 110.1 - 79.5 | 0.24 |
| 2 | 1 | 88.1 | 110.8 - 83.0 | 0.26 |
| 3 | 1 | 80.8 | 104.4 - 78.0 | 0.40 |
| | | | | Average: 0.30 |
| | | | | ±0.07 |
| | | | | ±23% |
| (3) "DUOFOLD" Two-layer Insulated Underwear, T-shirt, 42, Trousers, 36-L Duofold Inc., Mohawk, N.Y. (after 10 washings) | | | | |
| 1 | 1 | 77.6 | 106.6 - 82.0 | 0.29 |
| 2 | 1 | 74.1 | 102.3 - 75.0 | 0.45 |
| 3 | 1 | 68.2 | 100.3 - 80.0 | 0.23 |
| | | | | Average: 0.32 |
| | | | | ±0.08 |
| | | | | ±25% |
| (4) Ground Crew Climatic Clothing | | | | |
| a. Cotton T-shirt and briefs | | | | |
| b. Gray cotton field trousers | | | | |
| 1 | 1 | 72.2 | 100.7 - 74.0 | 0.44 |
| 2 | 1 | 80.8 | 104.5 - 76.5 | 0.37 |
| 3 | 1 | 89.3 | 110.3 - 79.5 | 0.37 |
| | | | | Average: 0.39 |
| | | | | ±0.03 |
| | | | | ±7.7% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (5) Two-piece Allen-A Insulaire Thermal Underwear (Size 7) | | | | |
| 1 | 1 | 58.7 | 102.8 - 81.0 | 0.45 |
| 2 | 1 | 67.1 | 106.0 - 83.0 | 0.36 |
| 3 | 1 | 72.7 | 106.4 - 80.5 | <u>0.40</u> |
| | | | | Average: 0.40 |
| | | | | ± 0.03 |
| | | | | $\pm 7.5\%$ |
| (6) "VALHALLA" Two-piece Brynje Underwear, large, Norwegian - American Knitting Mills, Bennington, Vt. | | | | |
| 1 | 1 | 57.5 | 114.6 - 84.0 | 0.30 |
| 2 | 1 | 71.7 | 116.3 - 76.0 | 0.40 |
| 3 | 1 | 54.3 | 109.3 - 77.0 | <u>0.50</u> |
| | | | | Average: 0.40 |
| | | | | ± 0.07 |
| | | | | $\pm 18\%$ |
| (7) "DUOFOLD" Two-layer Insulated Underwear, T-shirt, 42, Trousers, 36-L Duofold Inc., Mohawk, N.Y. | | | | |
| 1 | 1 | 63.3 | 100.6 - 77.0 | 0.45 |
| 2 | 1 | 74.5 | 106.1 - 79.0 | 0.42 |
| 3 | 1 | 90.0 | 110.4 - 79.0 | <u>0.38</u> |
| | | | | Average: 0.42 |
| | | | | ± 0.02 |
| | | | | $\pm 4.8\%$ |
| (8) "NORAK" Two-piece Brynje Underwear, med., Norwegian - American Knitting Mills, Bennington, Vt. | | | | |
| 1 | 1 | 57.8 | 117.2 - 81.0 | 0.59 |
| 2 | 1 | 49.1 | 108.5 - 78.5 | 0.55 |
| 3 | 1 | 55.2 | 113.5 - 82.5 | 0.39 |
| 4 | 1 | 56.2 | 111.4 - 83.0 | 0.22 |
| 5 | 1 | 61.9 | 120.5 - 85.0 | <u>0.43</u> |
| | | | | Average: 0.44 |
| | | | | ± 0.11 |
| | | | | $\pm 25\%$ |
| (9) "IDEAL" Two-piece Brynje Underwear, large, Brynje Health Underwear, Norway | | | | |
| 1 | 1 | 50.7 | 111.8 - 81.5 | 0.51 |
| 2 | 1 | 54.8 | 114.9 - 83.0 | 0.46 |
| 3 | 1 | 63.9 | 119.8 - 84.0 | <u>0.39</u> |
| | | | | Average: 0.45 |
| | | | | ± 0.04 |
| | | | | $\pm 8.9\%$ |

| TEST NO. | MODEL | W_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|----------------------|
| (10) Standard AF two-piece 50-50 Cotton-Wool Underwear (medium) (after 10 washings) | | | | |
| 1 | 1 | 56.2 | 97.9 - 77.0 | 0.45 |
| 2 | 1 | 69.1 | 102.3 - 80.0 | 0.51 |
| 3 | 1 | 74.9 | 109.2 - 80.5 | 0.48 |
| | | | | Average: <u>0.48</u> |
| | | | | ± 0.02 |
| | | | | $\pm 4.2\%$ |
| (11) Standard AF Two-piece 50-50 Cotton-Wool Underwear (medium) | | | | |
| 1 | 1 | 50.2 | 105.6 - 85.0 | 0.57 |
| 2 | 1 | 61.1 | 104.9 - 82.0 | 0.45 |
| 3 | 1 | 54.6 | 102.4 - 81.0 | 0.51 |
| | | | | Average: <u>0.51</u> |
| | | | | ± 0.04 |
| | | | | $\pm 7.8\%$ |
| (12) Two-piece Cotton-Wool Underwear, Style 303 | | | | |
| 1 | 1 | 73.3 | 101.9 - 73.5 | 0.50 |
| 2 | 1 | 90.1 | 115.8 - 79.0 | 0.56 |
| | | | | Average: <u>0.53</u> |
| | | | | ± 0.03 |
| | | | | $\pm 5.7\%$ |
| (13) Experimental Two-piece Underwear, Style V-1S and V-1D 50% Vicara, 40% Cotton, 10% Nylon | | | | |
| 1 | 1 | 85.2 | 115.0 - 80.0 | 0.57 |
| 2 | 1 | 75.4 | 113.4 - 83.0 | 0.55 |
| 3 | 1 | 66.5 | 108.0 - 82.0 | 0.51 |
| | | | | Average: <u>0.54</u> |
| | | | | ± 0.02 |
| | | | | $\pm 3.7\%$ |
| (14) Two-piece Allen-A Insulaire Thermal Underwear (medium), as used by Navy (after 10 washings) | | | | |
| 1 | 1 | 71.8 | 105.6 - 76.5 | 0.55 |
| 2 | 1 | 70.2 | 111.9 - 83.0 | 0.57 |
| 3 | 1 | 62.1 | 109.5 - 85.5 | 0.50 |
| | | | | Average: <u>0.54</u> |
| | | | | ± 0.03 |
| | | | | $\pm 5.6\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|----------------------|
| (15) Two-piece Allen-A Insulaire Thermal Underwear (medium) as used by Navy | | | | |
| 1 | 1 | 69.4 | 105.2 - 77.0 | 0.56 |
| 2 | 1 | 74.3 | 109.8 - 77.0 | 0.66 |
| 3 | 1 | 80.1 | 112.7 - 80.0 | 0.56 |
| | | | | Average: <u>0.59</u> |
| | | | | ± 0.04 |
| | | | | $\pm 6.8\%$ |
| (16) Two-piece Underwear, Heavy Zone, Cotton-Wool, Style 303 | | | | |
| 1 | 1 | 76.0 | 120.7 - 87.5 | 0.65 |
| 2 | 1 | 61.2 | 112.9 - 87.5 | 0.58 |
| 3 | 1 | 53.3 | 111.9 - 89.5 | 0.60 |
| | | | | Average: <u>0.61</u> |
| | | | | ± 0.03 |
| | | | | $\pm 4.9\%$ |
| (17) Experimental Two-piece Underwear, Style V-2S and V-2D 85% Vicara, 15% Nylon, DuPont (after 10 washings) | | | | |
| 1 | 1 | 64.5 | 108.9 - 81.5 | 0.61 |
| 2 | 1 | 70.6 | 108.4 - 77.5 | 0.65 |
| 3 | 1 | 74.6 | 109.6 - 78.0 | 0.61 |
| | | | | Average: <u>0.62</u> |
| | | | | ± 0.02 |
| | | | | $\pm 3.2\%$ |
| (18) Two-piece Underwear, Style 301 (bulk orlon between two cotton layers) (after 10 washings) | | | | |
| 1 | 1 | 60.1 | 101.9 - 76.0 | 0.63 |
| 2 | 1 | 65.2 | 110.9 - 83.0 | 0.62 |
| 3 | 1 | 66.3 | 112.1 - 83.5 | 0.63 |
| | | | | Average: <u>0.63</u> |
| | | | | ± 0.00 |
| | | | | $\pm 0.0\%$ |
| (19) Experimental Two-piece Underwear, Style 302 (Vicara and Nylon between two layers of cotton) | | | | |
| 1 | 1 | 61.3 | 113.2 - 86.0 | 0.67 |
| 2 | 1 | 74.5 | 115.8 - 82.5 | 0.58 |
| 3 | 1 | 65.1 | 111.1 - 82.5 | 0.66 |
| | | | | Average: <u>0.64</u> |
| | | | | ± 0.03 |
| | | | | $\pm 4.7\%$ |

| TEST NO. | MODEL | q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (20) "SET SNUG" Two-piece Curon Insulated Underwear, med., Set Snug Knitwear Co., Incl. (after 10 washings) | | | | |
| 1 | 1 | 59.8 | 102.3 - 75.0 | 0.72 |
| 2 | 1 | 58.3 | 107.3 - 83.0 | 0.60 |
| 3 | 1 | 67.5 | 112.6 - 82.5 | 0.69 |
| | | | | Average: 0.67 |
| | | | | ± 0.05 |
| | | | | $\pm 7.5\%$ |
| (21) Two-piece Underwear, Style 301 (bulk orlon between two cotton layers) | | | | |
| 1 | 1 | 76.3 | 116.6 - 81.0 | 0.79 |
| 2 | 1 | 71.0 | 114.2 - 81.0 | 0.75 |
| 3 | 1 | 59.1 | 108.1 - 82.5 | 0.64 |
| | | | | Average: 0.71 |
| | | | | ± 0.05 |
| | | | | $\pm 7.1\%$ |
| (22) Experimental Two-piece Underwear, Style V-2S and V-2D (85% Vicara, 15% Nylon, DuPont) | | | | |
| 1 | 1 | 76.6 | 114.8 - 84.6 | 0.54 |
| 2 | 1 | 70.1 | 112.4 - 81.5 | 0.66 |
| 3 | 1 | 65.9 | 109.9 - 82.5 | 1.05 |
| | | | | Average: 0.75 |
| | | | | ± 0.20 |
| | | | | $\pm 27\%$ |
| (23) Two-piece Heavy Underwear, Heavy Zone, Style 303, Cotton and Wool | | | | |
| 1 | 1 | 68.3 | 108.0 - 75.5 | 0.77 |
| 2 | 1 | 72.1 | 110.7 - 76.0 | 0.79 |
| 3 | 1 | 78.9 | 112.5 - 76.0 | 0.73 |
| | | | | Average: 0.76 |
| | | | | ± 0.02 |
| | | | | $\pm 2.6\%$ |
| (24) Experimental Inflatable Exposure Suit (not inflated) | | | | |
| 1 | 1 | 44.3 | 93.8 - 71.5 | 0.86 |
| 2 | 1 | 51.6 | 99.2 - 75.0 | 0.75 |
| 3 | 1 | 62.9 | 105.2 - 76.0 | 0.73 |
| | | | | Average: 0.78 |
| | | | | ± 0.05 |
| | | | | $\pm 6.4\%$ |

| TEST NO. | MODEL | q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|----------------|
| (25) Experimental Inflatable Exposure Suit (inflated) | | | | |
| 1 | 1 | 44.5 | 99.6 - 79.0 | 0.73 |
| 2 | 1 | 52.8 | 106.9 - 82.5 | 0.73 |
| 3 | 1 | 62.5 | 109.4 - 78.0 | 0.85 |
| 4 | 1 | 61.8 | 109.3 - 79.0 | 0.81 |
| | | | | Average: 0.78 |
| | | | | ± 0.05 |
| | | | | $\pm 6.4\%$ |
| (26) Ground Crew Climatic Clothing Assembly | | | | |
| a. Cotton T-shirt and briefs | | | | |
| b. Gray Cotton shirt and trousers | | | | |
| 1 | 1 | 71.9 | 106.6 - 70.0 | 0.87 |
| 2 | 1 | 78.1 | 111.6 - 73.0 | 0.83 |
| 3 | 1 | 85.5 | 117.4 - 75.5 | 0.81 |
| | | | | Average: 0.84 |
| | | | | ± 0.02 |
| | | | | $\pm 2.4\%$ |
| (27) One-piece Flight Alert Suit | | | | |
| a. Two-piece "Norak" Brynjs underwear | | | | |
| b. One-piece flight alert suit | | | | |
| 1 | 1 | 46.5 | 103.7 - 80.5 | 0.84 |
| 2 | 1 | 55.1 | 107.9 - 79.5 | 0.89 |
| 3 | 1 | 53.7 | 107.4 - 80.0 | 0.88 |
| | | | | Average: 0.87 |
| | | | | ± 0.02 |
| | | | | $\pm 2.3\%$ |
| (28) Light (Non-ventilated) Assembly | | | | |
| a. One-piece cotton thermocouple underwear | | | | |
| b. Light flying suit (K-2B) | | | | |
| c. Flight helmet (P-1) | | | | |
| d. Heavy wool knit socks | | | | |
| e. Saran spacer shoes | | | | |
| 1 | 2 | 58.7 | 104.2 - 74.0 | 0.94 |
| 2 | 2 | 52.2 | 102.5 - 77.1 | 0.86 |
| 3 | 2 | 48.8 | 99.7 - 74.0 | 0.98 |
| | | | | Average: 0.93* |
| | | | | ± 0.04 |
| | | | | $\pm 4.3\%$ |

* Mean effective clo (1 clo)_m

| TEST NO. | MODEL | w_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|----------------|
| (29) "SET SNUG" Two-piece Curon Insulated Underwear, med. Set Snug Knitwear Co., Inc. | | | | |
| 1 | 1 | 53.3 | 104.8 - 75.0 | 1.03 |
| 2 | 1 | 60.7 | 108.9 - 76.0 | 0.97 |
| 3 | 1 | 69.7 | 115.5 - 77.0 | <u>1.01</u> |
| | | | | Average: 1.00 |
| | | | | ± 0.02 |
| | | | | $\pm 2.0\%$ |
| (30) British Orally Inflatable Anti-Exposure Suit, not inflated (P. Frankenstein) | | | | |
| 1 | 1 | 37.1 | 101.5 - 80.0 | 1.09 |
| 2 | 1 | 53.1 | 108.3 - 80.0 | <u>0.95</u> |
| | | | | Average: 1.02 |
| | | | | ± 0.07 |
| | | | | $\pm 6.9\%$ |
| (31) Light (Non-ventilated) Assembly | | | | |
| a. One-piece cotton thermocouple underwear | | | | |
| b. Anti-exposure suit (MD-1), boots attached | | | | |
| c. Flight helmet (P-1) | | | | |
| d. Heavy wool knit socks | | | | |
| 1 | 2 | 44.1 | 102.1 - 76.0 | 1.18 |
| 2 | 2 | 50.0 | 103.8 - 77.5 | 0.98 |
| 3 | 2 | 46.0 | 99.4 - 75.5 | <u>0.96</u> |
| | | | | Average: 1.04* |
| | | | | ± 0.09 |
| | | | | $\pm 8.7\%$ |
| (32) Cotton T-shirt and Shorts | | | | |
| a. Cotton T-shirt and shorts | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| 1 | 1 | 38.5 | 105.3 - 84.0 | 1.01 |
| 2 | 1 | 45.1 | 110.7 - 85.0 | 1.06 |
| 3 | 1 | 51.2 | 114.9 - 86.0 | <u>1.04</u> |
| | | | | Average: 1.04 |
| | | | | ± 0.02 |
| | | | | $\pm 1.9\%$ |

* Mean effective clo (I_{clo_m})

| TEST NO. | MODEL | q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (33) "VALHALLA" Two-piece Underwear, large | | | | |
| a. Two-piece Valhalla underwear, large | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| 1 | 1 | 57.5 | 114.6 - 84.0 | 0.95 |
| 2 | 1 | 71.7 | 116.3 - 76.0 | 1.05 |
| 3 | 1 | 54.3 | 109.3 - 77.0 | <u>1.15</u> |
| | | | | Average: 1.05 |
| | | | | ± 0.07 |
| | | | | $\pm 6.7\%$ |
| (34) British Orally Inflatable Anti-Exposure Suit, inflated, 3-4 cm H ₂ O (P. Frankenstein) | | | | |
| 1 | 1 | 45.7 | 103.6 - 77.0 | 1.10 |
| 2 | 1 | 51.9 | 107.4 - 78.5 | <u>1.02</u> |
| | | | | Average: 1.06 |
| | | | | ± 0.04 |
| | | | | $\pm 3.8\%$ |
| (35) IDEAL Two-piece Underwear, large (BRYNJE Health Underwear, Norway) | | | | |
| a. Two-piece Ideal (Brynje) underwear, large | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| 1 | 1 | 50.7 | 111.8 - 81.5 | 1.16 |
| 2 | 1 | 54.8 | 114.9 - 83.0 | 1.11 |
| 3 | 1 | 63.9 | 119.8 - 84.0 | <u>1.04</u> |
| | | | | Average: 1.10 |
| | | | | ± 0.04 |
| | | | | $\pm 3.6\%$ |
| (36) Modified Flight Clothing (L.W. Foster Sportwear Co.) Assembly 1 (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Light flying suit, SFS-1 | | | | |
| 1 | 1 | 41.5 | 103.6 - 79.0 | 1.13 |
| 2 | 1 | 45.9 | 99.9 - 71.5 | <u>1.21</u> |
| | | | | Average: 1.17 |
| | | | | ± 0.04 |
| | | | | $\pm 3.4\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|-------------|
| (37) Gray Serge 100% Wool Shirt (A-1) and Trousers (E-1) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| 1 | 1 | 45.3 | 110.9 - 83.0 | 1.20 |
| 2 | 1 | 53.7 | 116.3 - 82.5 | 1.24 |
| 3 | 1 | 47.8 | 114.7 - 85.0 | <u>1.22</u> |
| Average: | | | | 1.22 |
| | | | | ± 0.01 |
| | | | | $\pm 0.8\%$ |
| (38) Ground Crew Climatic Clothing Assembly | | | | |
| a. Cotton T-shirt and briefs | | | | |
| b. Gray cotton shirt and trousers | | | | |
| c. "Jacket 1" | | | | |
| 1 | 1 | 57.4 | 110.6 - 75.0 | 1.22 |
| 2 | 1 | 62.9 | 115.5 - 76.5 | 1.22 |
| 3 | 1 | 64.8 | 117.5 - 77.0 | <u>1.23</u> |
| Average: | | | | 1.22 |
| | | | | ± 0.00 |
| | | | | ± 0.00 |
| (39) Modified-Flight Clothing (L.W. Foster Sportwear Co.) Assembly 1 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Light flying suit, SFS-1 | | | | |
| 1 | 1 | 50.0 | 115.1 - 85.5 | 1.13 |
| 2 | 1 | 44.8 | 116.6 - 88.5 | 1.23 |
| 3 | 1 | 41.3 | 107.9 - 81.0 | <u>1.31</u> |
| Average: | | | | 1.22 |
| | | | | ± 0.06 |
| | | | | $\pm 4.9\%$ |
| (40) Experimental Sealed Insulation Full Pressure Suit, CSU-5/P | | | | |
| 1 | 1 | 51.5 | 121.6 - 88.0 | 1.31 |
| 2 | 1 | 63.8 | 121.9 - 82.0 | <u>1.23</u> |
| Average: | | | | 1.27 |
| | | | | ± 0.04 |
| | | | | $\pm 3.1\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (41) Get-Me-Down Suit, CSU-4/P | | | | |
| 1 | 1 | 46.1 | 101.7 - 72.0 | 1.29 |
| 2 | 1 | 50.5 | 105.1 - 72.0 | 1.33 |
| 3 | 1 | 51.4 | 110.3 - 77.0 | <u>1.30</u> |
| | | | | Average: 1.31 |
| | | | | ±0.02 |
| | | | | ±1.5% |
| (42) Ground Crew Climatic Clothing Assembly | | | | |
| a. Two-piece cotton-wool underwear, Style 303 | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| 1 | 1 | 47.3 | 111.3 - 80.0 | 1.35 |
| 2 | 1 | 54.7 | 116.0 - 80.0 | 1.33 |
| 3 | 1 | 60.7 | 119.3 - 79.0 | <u>1.35</u> |
| | | | | Average: 1.34 |
| | | | | ±0.01 |
| | | | | ±0.8% |
| (43) "Weatherall" Two-piece Liner (30-70 acetate-virgin wool, Outdoor Products Co. Bloomfield, N.J.) | | | | |
| 1 | 1 | 42.9 | 107.0 - 78.0 | 1.39 |
| 2 | 1 | 50.9 | 113.1 - 80.0 | <u>1.31</u> |
| | | | | Average: 1.35 |
| | | | | ±0.04 |
| | | | | ±2.9% |

TABLE 2

INSULATION TESTS OF MEDIUM (BODY) CLOTHING (1.50 - 3.00 clo)

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (1) Experimental Polyurethane Suit, Convair Co. | | | | |
| 1 | 1 | 41.9 | 114.4 - 83.5 | 1.63 |
| 2 | 1 | 48.3 | 116.9 - 82.0 | 1.58 |
| 3 | 1 | 49.6 | 117.8 - 81.5 | <u>1.61</u> |
| | | | | Average: 1.61 |
| | | | | ±0.02 |
| | | | | ±1.2% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (2) Spacer Insulated Coverall, P/N S-885 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Spacer insulated coverall, P/N S-885 | | | | |
| 1 | 1 | 48.0 | 108.6 - 74.0 | 1.53 |
| 2 | 1 | 50.0 | 118.4 - 79.0 | 1.73 |
| 3 | 1 | 47.0 | 114.7 - 77.5 | <u>1.74</u> |
| | | | | Average: 1.67 |
| | | | | ±0.09 |
| | | | | ±5.4% |
| (3) "Zero Wear" Two-piece Polyurethane ("Curon") Lined Underwear Tan Colored, Curtiss-Wright, Quenhanna, Pa. (medium) | | | | |
| a. Two-piece 50-50 cotton-wool standard AF underwear | | | | |
| b. "Zero Wear" polyurethane lined underwear, tan | | | | |
| 1 | 1 | 53.1 | 118.3 - 78.0 | 1.64 |
| 2 | 1 | 52.9 | 124.3 - 84.0 | 1.65 |
| 3 | 1 | 43.7 | 113.3 - 78.5 | <u>1.75</u> |
| | | | | Average: 1.68 |
| | | | | ±0.05 |
| | | | | ±2.9% |
| (4) Modified Flight Clothing (L.W. Foster Sportswear Co.), Assembly 2 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Light flying suit, SFS-1 | | | | |
| c. Light jacket, LW2 | | | | |
| 1 | 1 | 33.0 | 108.0 - 84.5 | 1.50 |
| 2 | 1 | 35.2 | 105.6 - 78.0 | 1.72 |
| 3 | 1 | 36.1 | 115.7 - 85.0 | <u>1.92</u> |
| | | | | Average: 1.71 |
| | | | | ±0.14 |
| | | | | ±8.2% |
| (5) Modified Flight Clothing (L.W. Foster Sportswear Co.), Assembly 2 (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Light flying suit, SFS-1 | | | | |
| c. Light jacket, LW2 | | | | |
| 1 | 1 | 41.7 | 105.3 - 74.0 | 1.62 |
| 2 | 1 | 45.9 | 112.2 - 75.0 | <u>1.80</u> |
| | | | | Average: 1.71 |
| | | | | ±0.09 |
| | | | | ±5.3% |

| TEST NO. | MODEL | ψ_b | $T_s - T_a$ | I_g |
|--|-------|----------|--------------|---------------|
| (6) "Zero Wear" Two-piece Polyurethane ("Curon") Lined Underwear Red Colored, Curtiss-Wright, Quehanna, Pa., (Men's, long size) | | | | |
| a. Two-piece 50-50 cotton-wool standard AF underwear | | | | |
| b. "Zero Wear" polyurethane lined underwear, red | | | | |
| 1 | 1 | 35.1 | 103.7 - 77.0 | 1.65 |
| 2 | 1 | 38.5 | 106.6 - 76.0 | 1.76 |
| 3 | 1 | 39.2 | 110.3 - 79.0 | <u>1.76</u> |
| | | | | Average: 1.72 |
| | | | | ± 0.05 |
| | | | | $\pm 2.9\%$ |
| (7) Navy Clothing for Intermediate Cold Weather | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Navy jacket and trousers for intermediate cold weather, medium | | | | |
| 1 | 1 | 32.5 | 103.8 - 79.0 | 1.66 |
| 2 | 1 | 38.7 | 112.1 - 81.0 | <u>1.78</u> |
| | | | | Average: 1.72 |
| | | | | ± 0.06 |
| | | | | $\pm 3.5\%$ |
| (8) Ground Crew Climatic Clothing Assembly | | | | |
| a. Two-piece cotton-wool underwear, Style 303 | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. "Jacket 1" | | | | |
| d. Collared jacket, two layers of wool backed nylon, wool-to-wool ("Jacket 2") | | | | |
| 1 | 1 | 46.7 | 113.7 - 77.0 | 1.73 |
| 2 | 1 | 40.9 | 116.1 - 76.5 | 1.80 |
| 3 | 1 | 51.5 | 118.9 - 79.0 | <u>1.69</u> |
| | | | | Average: 1.74 |
| | | | | ± 0.04 |
| | | | | $\pm 2.3\%$ |
| (9) Modified Flight Clothing (L.W. Foster Sportswear Co.), Assembly 3 (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Light flying suit, SFS-1 | | | | |
| c. Light jacket, LW-2A | | | | |
| 1 | 1 | 39.6 | 106.5 - 75.0 | 1.76 |
| 2 | 1 | 46.7 | 115.5 - 77.5 | <u>1.81</u> |
| | | | | Average: 1.79 |
| | | | | ± 0.03 |
| | | | | $\pm 1.7\%$ |

| TEST NO. | MODEL | C_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (10) "Skagway" Sportsman Garment (Eugene Urow) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Two-piece "Skagway" sportsman garment, Eugene Urow, Style No. 3497, dacron butt insulation, medium | | | | |
| 1 | 1 | 34.0 | 107.0 - 78.0 | 1.94 |
| 2 | 1 | 39.4 | 108.6 - 76.5 | 1.82 |
| 3 | 1 | 41.9 | 108.6 - 75.0 | <u>1.78</u> |
| | | | | Average: 1.85 |
| | | | | ±0.06 |
| | | | | ±3.2% |
| (11) Experimental Coverall CWU-1/P (formerly XB-78), outer shell 5.3 oz. nylon, interlining 8 oz. rayon wool | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental coverall, CWU-1/P | | | | |
| 1 | 1 | 49.9 | 114.6 - 74.5 | 1.78 |
| 2 | 1 | 46.3 | 113.7 - 74.0 | 1.95 |
| 3 | 1 | 44.8 | 113.4 - 76.0 | <u>1.88</u> |
| | | | | Average: 1.87 |
| | | | | ±0.06 |
| | | | | ±3.2% |
| (12) Experimental Flying Coverall, CWU-1/P, with nylon-taffeta (136 x 69) liner attached | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental flying coverall, CWU-1/P, and liner | | | | |
| 1 | 1 | 39.4 | 111.4 - 78.5 | 1.88 |
| 2 | 1 | 43.5 | 116.9 - 81.0 | 1.85 |
| 3 | 1 | 37.1 | 112.7 - 79.5 | <u>1.90</u> |
| | | | | Average: 1.88 |
| | | | | ±0.02 |
| | | | | ±1.1% |
| (13) "Skagway" Sportsman Garment (Eugene Urow) (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Skagway" sportsman garment, Eugene Urow, Style No. 3497, Dacron butt insulation, medium | | | | |
| 1 | 1 | 34.5 | 107.0 - 78.0 | 1.90 |
| 2 | 1 | 44.8 | 115.1 - 78.0 | <u>1.86</u> |
| | | | | Average: 1.88 |
| | | | | ±0.04 |
| | | | | ±2.1% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (14) Navy Assembly for Intermediate Cold Weather | | | | |
| a. Waffle knit two-piece underwear, standard A-1 (medium) | | | | |
| b. Jacket (A-2) and trousers (X-54), (medium) | | | | |
| 1 | 1 | 32.3 | 103.4 - 72.0 | 1.83 |
| 2 | 1 | 34.6 | 108.3 - 78.5 | 1.96 |
| 3 | 1 | 38.7 | 108.9 - 77.0 | <u>1.87</u> |
| | | | | Average: 1.89 |
| | | | | ±0.05 |
| | | | | ±2.6% |
| (15) "Dutchess" Flite Wear | | | | |
| (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Dutchess" Flite Wear, Style T-500, two-piece, dacron butt insulation, medium | | | | |
| 1 | 1 | 31.6 | 101.9 - 76.5 | 1.78 |
| 2 | 1 | 35.3 | 105.4 - 74.5 | <u>2.01</u> |
| | | | | Average: 1.90 |
| | | | | ±0.12 |
| | | | | ±6.3% |
| (16) Experimental Polyether Urethane Foam Liner, U.S. Rubber Co. | | | | |
| (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Two-piece experimental liner, medium | | | | |
| 1 | 1 | 42.8 | 112.3 - 76.0 | 1.92 |
| 2 | 1 | 46.7 | 115.0 - 75.0 | 1.95 |
| 3 | 1 | 52.3 | 122.5 - 79.0 | <u>1.87</u> |
| | | | | Average: 1.91 |
| | | | | ±0.03 |
| | | | | ±1.6% |
| (17) Experimental Flying Coverall, CWU-1/P, with Nylon-Millium Liner attached | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental flying coverall, CWU-1/P, and liner | | | | |
| 1 | 1 | 33.8 | 110.7 - 77.0 | 2.38 |
| 2 | 1 | 36.7 | 116.4 - 87.0 | 1.77 |
| 3 | 1 | 42.4 | 118.5 - 86.5 | <u>1.67</u> |
| | | | | Average: 1.93 |
| | | | | ±0.29 |
| | | | | ±15% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (18) Experimental Two-piece Dynel Insulation Liner, U.S. Rubber (after 10 washings) | | | | |
| 1 | 1 | 45.4 | 115.2 - 76.0 | 1.97 |
| 2 | 1 | 41.9 | 115.5 - 79.0 | 1.99 |
| 3 | 1 | 40.7 | 110.2 - 77.0 | <u>1.83</u> |
| | | | | Average: 1.93 |
| | | | | ±0.07 |
| | | | | ±3.6% |
| (19) Ground Crew Climatic Clothing Assembly | | | | |
| a. Two-piece cotton-wool underwear, Style 303 | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. "Jacket 1" | | | | |
| d. Collared jacket, two layers of wool-backed nylon, wool-to-wool ("Jacket 2") | | | | |
| 1 | 1 | 40.9 | 112.8 - 75.0 | 1.93 |
| 2 | 1 | 44.6 | 115.5 - 78.5 | 1.86 |
| 3 | 1 | 47.1 | 119.3 - 78.0 | <u>2.01</u> |
| | | | | Average: 1.93 |
| | | | | ±0.05 |
| | | | | ±2.6% |
| (20) "Satellite" Two-piece Insulated Underwear (Outwear Co.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Satellite" two-piece underwear, Outwear Co., Style T-100, Dacron butt insulation, medium | | | | |
| 1 | 1 | 32.8 | 109.4 - 81.5 | 1.93 |
| 2 | 1 | 36.7 | 111.3 - 80.0 | 1.93 |
| 3 | 1 | 31.0 | 107.5 - 80.5 | <u>1.99</u> |
| | | | | Average: 1.95 |
| | | | | ±0.03 |
| | | | | ±1.5% |
| (21) Dormer Werner Two-piece Insulated Underwear | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Dormer Werner Inc., two-piece 100% Dacron insulated underwear, Arctic Feather and Down Co., Style No. 46, medium | | | | |
| 1 | 1 | 37.3 | 107.8 - 77.0 | 1.85 |
| 2 | 1 | 40.3 | 112.5 - 78.0 | 1.95 |
| 3 | 1 | 42.9 | 117.1 - 79.0 | <u>2.04</u> |
| | | | | Average: 1.95 |
| | | | | ±0.06 |
| | | | | ±3.1% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (22) Experimental Jacket, XMA-1 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (A-1) | | | | |
| c. Experimental jacket, XMA-1 | | | | |
| d. Standard cotton field trousers | | | | |
| 1 | 1 | 40.4 | 116.3 - 81.0 | 2.00 |
| 2 | 1 | 37.3 | 112.2 - 80.0 | 1.97 |
| 3 | 1 | 49.5 | 122.4 - 80.5 | <u>1.92</u> |
| | | | | Average: 1.96 |
| | | | | ± 0.03 |
| | | | | $\pm 1.5\%$ |
| (23) Experimental Flying Coverall (CWU-1/P) with Liner, rayon-sateen (180 x 60) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental CWU-1/P flying coverall with liner | | | | |
| 1 | 1 | 34.4 | 109.9 - 79.5 | 2.03 |
| 2 | 1 | 37.7 | 110.2 - 78.0 | 1.94 |
| 3 | 1 | 45.1 | 119.9 - 81.0 | <u>1.97</u> |
| | | | | Average: 1.98 |
| | | | | ± 0.03 |
| | | | | $\pm 1.5\%$ |
| (24) "Satellite" Two-piece Insulated Underwear (Outwear Co.) (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Satellite" two-piece underwear, Outwear Co., Style T-100, Dacron butt insulation, medium | | | | |
| 1 | 1 | 35.1 | 106.6 - 75.5 | 2.04 |
| 2 | 1 | 42.5 | 111.6 - 75.5 | <u>1.92</u> |
| | | | | Average: 1.98 |
| | | | | ± 0.06 |
| | | | | $\pm 3.0\%$ |
| (25) Spacer Insulated Coverall, P/N S-885 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Spacer insulated coverall, P/N S-885 | | | | |
| c. Water barrier coverall | | | | |
| 1 | 1 | 42.7 | 117.8 - 80.0 | 2.03 |
| 2 | 1 | 49.9 | 121.8 - 78.0 | 2.01 |
| 3 | 1 | 52.0 | 118.9 - 74.0 | <u>1.97</u> |
| | | | | Average: 2.00 |
| | | | | ± 0.02 |
| | | | | $\pm 1.0\%$ |

| ITEM NO. | MODEL | Q _b | T _s - T _a | I _g |
|-------------|-------|----------------|---------------------------------|----------------|
|-------------|-------|----------------|---------------------------------|----------------|

(26) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 3

- a. Two-piece 50-50 cotton-wool underwear
- b. Light flying suit, SFS-1
- c. Light jacket, LW-2A

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 44.2 | 114.2 - 80.0 | 1.69 |
| 2 | 1 | 37.4 | 125.5 - 91.0 | 2.15 |
| 3 | 1 | 35.9 | 124.1 - 91.0 | <u>2.15</u> |
| Average: 2.00 | | | | ±0.20 |
| | | | | ±10% |

(27) Modified (Sealed Insulation) Get-Me-Down Suit, CSU-5/P

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 34.1 | 110.6 - 81.5 | 1.94 |
| 2 | 1 | 37.7 | 110.5 - 78.0 | 2.01 |
| 3 | 1 | 39.3 | 111.3 - 75.5 | <u>2.11</u> |
| Average: 2.02 | | | | ±0.06 |
| | | | | ±3.0% |

(28) Modified Flight Clothing (L.W. Foster Sportswear, Co.) Assembly 4
(after 10 washings)

- a. Two-piece 50-50 cotton-wool underwear
- b. Medium, woven urethane M-3 jacket and trousers

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 35.9 | 102.5 - 71.5 | 1.97 |
| 2 | 1 | 40.7 | 111.4 - 75.0 | <u>2.06</u> |
| Average: 2.02 | | | | ±0.05 |
| | | | | ±2.5% |

(29) Experimental Coverall (CWU-1/P) with Rayon-Sateen-Millium Liner

- a. Two-piece 50-50 cotton-wool underwear
- b. Experimental coverall, CWU-1/P with liner

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 46.9 | 120.2 - 78.5 | 2.05 |
| 2 | 1 | 35.5 | 106.2 - 75.0 | 2.02 |
| 3 | 1 | 38.4 | 108.7 - 74.0 | <u>2.07</u> |
| Average: 2.05 | | | | ±0.02 |
| | | | | ±1.0% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (30) "Polar Wear" Two-piece Liner, 100% Dacron (Dormer-Werner Inc., Bloomfield, N.J.) (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Polar Wear" Liner | | | | |
| 1 | 1 | 42.5 | 112.6 - 75.5 | 2.07 |
| 2 | 1 | 43.2 | 113.8 - 76.0 | 2.00 |
| 3 | 1 | 48.5 | 117.7 - 74.0 | <u>2.08</u> |
| | | | | Average: 2.05 |
| | | | | ±0.03 |
| | | | | ±1.5% |
| (31) Experimental Flying Coverall (CWU-1/P) with Neoprene Coated Nylon Rip Stop Liner, Type 1 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. CWU-1/P flying coverall with liner | | | | |
| 1 | 1 | 34.7 | 109.8 - 81.5 | 1.82 |
| 2 | 1 | 38.7 | 114.4 - 79.0 | 2.13 |
| 3 | 1 | 42.3 | 116.6 - 76.5 | <u>2.23</u> |
| | | | | Average: 2.06 |
| | | | | ±0.16 |
| | | | | ±7.8% |
| (32) Experimental Polyether Urethane Foam Liner, U.S. Rubber Co. | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental two-piece polyether urethane foam liner | | | | |
| 1 | 1 | 45.0 | 119.0 - 78.5 | 2.08 |
| 2 | 1 | 42.4 | 114.7 - 78.0 | 1.97 |
| 3 | 1 | 45.1 | 119.0 - 77.5 | <u>2.14</u> |
| | | | | Average: 2.06 |
| | | | | ±0.06 |
| | | | | ±2.9% |
| (33) Experimental Two-piece Dynel Insulation Liner, U.S. Rubber Co. | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental Dynel Insulation liner, medium | | | | |
| 1 | 1 | 38.0 | 115.5 - 82.0 | 2.02 |
| 2 | 1 | 39.0 | 117.3 - 81.0 | 2.12 |
| 3 | 1 | 45.3 | 121.0 - 79.0 | <u>2.17</u> |
| | | | | Average: 2.10 |
| | | | | ±0.06 |
| | | | | ±2.9% |

| ITEM NO. | MODEL | Q _b | T _s - T _a | I g |
|--|-------|----------------|---------------------------------|---------------|
| (34) Ground Crew Climatic Clothing Assembly | | | | |
| a. Two-piece cotton-wool underwear, Style 303 | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. "Jacket 1" | | | | |
| d. "Jacket 2" | | | | |
| e. Collarless jacket, two layers of wool backed nylon, wool-to-wool ("Jacket 3") | | | | |
| 1 | 1 | 43.6 | 110.2 - 77.5 | 1.97 |
| 2 | 1 | 46.1 | 120.7 - 78.0 | 2.16 |
| 3 | 1 | 45.8 | 121.7 - 78.5 | <u>2.17</u> |
| | | | | Average: 2.10 |
| | | | | ±0.09 |
| | | | | ±4.4% |
| (35) Modified Ground Crew Climatic Clothing | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. "Jacket 1", light weight | | | | |
| d. Modified "Jacket 2", intermediate | | | | |
| 1 | 1 | 36.1 | 107.2 - 75.0 | 2.06 |
| 2 | 1 | 39.3 | 113.1 - 77.0 | <u>2.14</u> |
| | | | | Average: 2.10 |
| | | | | ±0.04 |
| | | | | ±1.9% |
| (36) U.S. Rubber Co. Two-piece Insulated Underwear, USR-W-200 urethane plastic foam insulation, medium | | | | |
| 1 | 1 | 37.5 | 107.5 - 74.5 | 2.02 |
| 2 | 1 | 40.6 | 111.2 - 73.0 | <u>2.21</u> |
| | | | | Average: 2.12 |
| | | | | ±0.10 |
| | | | | ±4.7% |
| (37) "Wunderwear" Two-piece Liner, (tubular quilting, Nylon shells, quilted with 100% Dacron (fiberfold) (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Wunderwear" two-piece liner | | | | |
| 1 | 1 | 35.7 | 115.4 - 81.5 | 2.23 |
| 2 | 1 | 34.7 | 111.0 - 79.0 | 2.15 |
| 3 | 1 | 29.8 | 107.2 - 81.0 | <u>2.02</u> |
| | | | | Average: 2.13 |
| | | | | ±0.08 |
| | | | | ±3.8% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|----------------------|
| (38) Navy Assembly for Very Cold Weather | | | | |
| a. Waffle knit standard two-piece underwear, A-1, medium | | | | |
| b. Jacket (A-1) and trousers (X-54), medium-regular, without buttoned-in liner in jacket | | | | |
| 1 | 1 | 36.8 | 111.6 - 76.0 | 2.29 |
| 2 | 1 | 35.9 | 108.3 - 75.0 | 2.17 |
| 3 | 1 | 45.9 | 118.0 - 78.5 | <u>1.96</u> |
| | | | | Average: <u>2.14</u> |
| | | | | ± 0.12 |
| | | | | $\pm 5.6\%$ |
| (39) Experimental Polyurethane Jacket, MA-1 (3.3 oz. Nylon lined), DuPont | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Standard cotton field trousers | | | | |
| d. Experimental jacket (MA-1) | | | | |
| 1 | 1 | 38.1 | 119.6 - 85.0 | 2.11 |
| 2 | 1 | 33.7 | 112.2 - 80.5 | <u>2.21</u> |
| | | | | Average: <u>2.16</u> |
| | | | | ± 0.05 |
| | | | | $\pm 2.3\%$ |
| (40) Dormer Werner Two-piece Insulated Underwear (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Dormer Werner Inc., two-piece 100% Dacron insulated underwear, Arctic Feather and Down Co., Style No. 46, medium | | | | |
| 1 | 1 | 34.9 | 102.8 - 70.5 | 2.16 |
| 2 | 1 | 39.7 | 111.3 - 74.5 | <u>2.16</u> |
| | | | | Average: <u>2.16</u> |
| | | | | ± 0.00 |
| | | | | $\pm 0.0\%$ |
| (41) "Wunderwear" Two-piece liner (tubular quilting, nylon shells quilted with 100% Dacron fiberfold) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Wunderwear" two-piece liner | | | | |
| 1 | 1 | 40.7 | 116.4 - 78.5 | 2.21 |
| 2 | 1 | 41.2 | 118.3 - 80.0 | 2.17 |
| 3 | 1 | 42.8 | 123.7 - 83.5 | <u>2.20</u> |
| | | | | Average: <u>2.19</u> |
| | | | | ± 0.02 |
| | | | | $\pm 0.9\%$ |

| TEST NO. | MODEL | Q _b | T _s - T _a | I _g |
|---|-------|----------------|---------------------------------|----------------|
| (42) "Dutchess" Flite Wear | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Dutchess" Flite Wear, Style T-500, two-piece, Dacron butt insulation, medium | | | | |
| 1 | 1 | 30.6 | 109.5 - 80.5 | 2.23 |
| 2 | 1 | 33.5 | 111.5 - 80.0 | 2.20 |
| 3 | 1 | 35.6 | 115.2 - 82.0 | <u>2.18</u> |
| | | | | Average: 2.20 |
| | | | | ±0.02 |
| | | | | ±0.9% |
| (43) "Comfortall" Two-piece Liner (Tempron Clothing-Budd Insulated Products, Inc., Larchmont, N.Y.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Comfortall" two-piece liner | | | | |
| 1 | 1 | 45.4 | 121.3 - 80.0 | 2.11 |
| 2 | 1 | 38.0 | 118.5 - 82.0 | 2.27 |
| 3 | 1 | 40.8 | 116.4 - 77.5 | <u>2.25</u> |
| | | | | Average: 2.21 |
| | | | | ±0.07 |
| | | | | ±3.2% |
| (44) "Eskimo Brand" Two-piece Liner (Brooks Insulating Clothing Co., New York, N.Y.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Eskimo Brand" two-piece liner | | | | |
| 1 | 1 | 32.6 | 107.6 - 77.0 | 2.20 |
| 2 | 1 | 39.9 | 116.1 - 78.5 | 2.21 |
| 3 | 1 | 42.9 | 123.1 - 80.0 | <u>2.40</u> |
| | | | | Average: 2.27 |
| | | | | ±0.09 |
| | | | | ±3.9% |
| (45) "Winterseal" Two-piece Liner (Refrigerator Clothing Co., New York, N.Y.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Winterseal" two-piece liner, medium | | | | |
| 1 | 1 | 44.7 | 123.2 - 82.0 | 2.15 |
| 2 | 1 | 40.1 | 120.3 - 81.5 | 2.29 |
| 3 | 1 | 36.1 | 119.7 - 84.0 | <u>2.36</u> |
| | | | | Average: 2.27 |
| | | | | ±0.08 |
| | | | | ±3.5% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|-------------|
| (46) "Polar Wear" Two-piece Liner (100% Dacron, Dormer-Werner, Inc., Bloomfield, N.J.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Polar Wear" two-piece liner, medium | | | | |
| 1 | 1 | 37.8 | 112.4 - 75.0 | 2.36 |
| 2 | 1 | 39.9 | 118.6 - 80.0 | 2.29 |
| 3 | 1 | 42.9 | 124.3 - 82.5 | <u>2.31</u> |
| Average: | | | | 2.32 |
| | | | | ± 0.03 |
| | | | | $\pm 1.3\%$ |
| (47) "Wunderwear" Two-piece Dacron-filled Liner, (tan, 3 x 3 construction) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Wunderwear" two-piece liner | | | | |
| 1 | 1 | 41.2 | 127.9 - 80.0 | 2.41 |
| 2 | 1 | 44.1 | 129.9 - 79.5 | 2.35 |
| 3 | 1 | 46.6 | 130.8 - 80.0 | <u>2.19</u> |
| Average: | | | | 2.32 |
| | | | | ± 0.08 |
| | | | | $\pm 3.4\%$ |
| (48) Get-Me-Down Suit (CSU-4/P) and Trilock Spacer Coverall | | | | |
| 1 | 1 | 38.2 | 115.8 - 79.0 | 2.28 |
| 2 | 1 | 41.8 | 118.4 - 77.0 | <u>2.36</u> |
| Average: | | | | 2.32 |
| | | | | ± 0.04 |
| | | | | $\pm 1.7\%$ |
| (49) U.S. Rubber Two-piece Insulated Underwear, USR-W-200 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. USR-W-200 Jacket and trousers, urethane plastic insulation, nylon outer shell, medium, U.S. Rubber Co. | | | | |
| 1 | 1 | 30.3 | 108.3 - 79.5 | 2.24 |
| 2 | 1 | 32.7 | 114.0 - 81.5 | 2.37 |
| 3 | 1 | 36.0 | 112.9 - 77.0 | <u>2.38</u> |
| Average: | | | | 2.33 |
| | | | | ± 0.06 |
| | | | | $\pm 2.6\%$ |

| TEST NO. | MODEL | z_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (50) "Weatherall" Two-piece Liner (30-70 Acetate-Virgin Wool, Outdoor Products Co., Bloomfield, N.J.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Weatherall" two-piece liner, medium | | | | |
| 1 | 1 | 33.6 | 119.3 - 83.5 | 2.59 |
| 2 | 1 | 41.7 | 120.2 - 81.0 | 2.20 |
| 3 | 1 | 42.1 | 122.3 - 82.0 | <u>2.27</u> |
| | | | | Average: 2.35 |
| | | | | ± 0.16 |
| | | | | $\pm 6.8\%$ |
| (51) Experimental Intermediate Assembly (Vibrafoam, U.S. Rubber Co.) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Experimental Vibrafoam field jacket | | | | |
| d. Standard cotton field trousers | | | | |
| 1 | 1 | 37.7 | 117.7 - 81.0 | 2.31 |
| 2 | 1 | 34.6 | 116.0 - 81.5 | 2.38 |
| 3 | 1 | 39.5 | 121.1 - 81.5 | <u>2.39</u> |
| | | | | Average: 2.36 |
| | | | | ± 0.03 |
| | | | | $\pm 1.3\%$ |
| (52) Modified B-78 Coverall (1/8" Durolite, U.S. Rubber Co.) | | | | |
| a. Two-piece 80-20 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Modified B-78 coverall | | | | |
| 1 | 1 | 43.4 | 115.4 - 72.5 | 2.36 |
| 2 | 1 | 36.2 | 110.5 - 73.0 | 2.50 |
| 3 | 1 | 42.1 | 118.5 - 78.0 | <u>2.27</u> |
| | | | | Average: 2.37 |
| | | | | ± 0.08 |
| | | | | $\pm 3.7\%$ |
| (53) Experimental Polyurethane Jacket (MA-1, Nylon-Wool Lined, DuPont) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Standard cotton field trousers | | | | |
| d. Experimental MA-1 jacket | | | | |
| 1 | 1 | 38.2 | 118.6 - 82.0 | 2.21 |
| 2 | 1 | 31.3 | 113.8 - 80.0 | 2.64 |
| 3 | 1 | 32.7 | 115.1 - 83.0 | <u>2.33</u> |
| | | | | Average: 2.41 |
| | | | | ± 0.17 |
| | | | | $\pm 7.1\%$ |

| TEST NO. | MODEL | q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (54) Experimental Intermediate Assembly, U.S. Rubber Co. | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Experimental field jacket, Insul Air, U.S. Rubber Co. | | | | |
| d. Standard cotton field trousers | | | | |
| 1 | 1 | 40.1 | 123.6 - 83.0 | 2.43 |
| 2 | 1 | 39.3 | 120.4 - 79.5 | 2.52 |
| 3 | 1 | 40.2 | 120.6 - 81.5 | <u>2.30</u> |
| | | | | Average: 2.42 |
| | | | | ±0.08 |
| | | | | ±3.3% |
| (55) Navy Assembly for Very Cold Weather | | | | |
| a. Standard waffle knit two-piece underwear, A-1, medium | | | | |
| b. Jacket (A-1) with buttoned-in liner and trousers (X-54), medium | | | | |
| 1 | 1 | 31.7 | 110.1 - 79.0 | 2.33 |
| 2 | 1 | 35.2 | 115.7 - 80.5 | 2.37 |
| 3 | 1 | 35.2 | 121.0 - 83.5 | <u>2.59</u> |
| | | | | Average: 2.43 |
| | | | | ±0.11 |
| | | | | ±4.5% |
| (56) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 5 (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Medium woven urethane M-3 jacket and trousers | | | | |
| 1 | 1 | 31.9 | 107.1 - 73.5 | 2.55 |
| 2 | 1 | 42.1 | 107.7 - 66.5 | <u>2.32</u> |
| | | | | Average: 2.44 |
| | | | | ±0.12 |
| | | | | ±4.9% |
| (57) "Wunderwear" Dacron-filled Liner, O.D. (after 10 washings) | | | | |
| 1 | 1 | 26.1 | 114.0 - 83.0 | 2.49 |
| 2 | 1 | 22.7 | 109.5 - 83.0 | 2.43 |
| 3 | 1 | 44.3 | 137.6 - 83.0 | <u>2.46</u> |
| | | | | Average: 2.46 |
| | | | | ±0.02 |
| | | | | ±0.8% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(58) Ventilating Garment Assembly (as used in cold chamber tests, using heated ventilating air)

- a. Two-piece 50-50 cotton-wool underwear
- b. Ventilating garment (MA-2)
- c. Heavy parka (N-2A) and trousers (D-1A)
- d. Cotton flight cap
- e. Green mitten insert
- f. Heavy two-piece mitten set, arctic wear
- g. Medium weight wool socks
- h. Heavy weight wool socks
- i. Flying boots (A-6A), large

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 43.7 | 127.8 - 82.0 | 2.54* |
| 2 | 1 | 46.9 | 132.0 - 83.0 | 2.53 |
| 3 | 1 | 51.8 | 136.2 - 83.0 | <u>2.47</u> |
| Average: 2.51 | | | | ±0.03 |
| | | | | ±1.2% |

(59) Standard Intermediate Assembly

- a. Two-piece 50-50 cotton-wool underwear
- b. Gray serge 100% wool shirt (A-1) and trousers (E-1)
- c. Standard field jacket with buttoned-in wool pile liner
- d. Standard cotton field trousers

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 37.7 | 118.7 - 81.0 | 2.39 |
| 2 | 1 | 38.5 | 122.7 - 82.5 | 2.53 |
| 3 | 1 | 31.9 | 112.4 - 79.0 | <u>2.62</u> |
| Average: 2.52 | | | | ±0.08 |
| | | | | ±3.2% |

(60) Experimental Jacket, MA-1, Polyurethane, Lined with 3.3 oz. Nylon, Dupont

- a. Two-piece 50-50 cotton-wool underwear
- b. Blue serge 100% wool shirt (A-1) and trousers (E-1)
- c. Heavy flight trousers (D-1A)
- d. Experimental MA-1 jacket

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 30.2 | 119.7 - 87.0 | 2.64 |
| 2 | 1 | 34.9 | 121.6 - 84.0 | 2.63 |
| 3 | 1 | 39.9 | 124.7 - 84.0 | <u>2.45</u> |
| Average: 2.57 | | | | ±0.08 |
| | | | | ±3.1% |

*mean effective clo (I_{clom})

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (61) Navy Dark Green Flying Suit (Curtis-Wright) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Dark green Navy flying suit | | | | |
| 1 | 1 | 38.0 | 121.0 - 80.5 | 2.59 |
| 2 | 1 | 29.8 | 115.0 - 83.0 | 2.62 |
| 3 | 1 | 40.9 | 119.4 - 79.0 | <u>2.50</u> |
| | | | | Average: 2.57 |
| | | | | ±0.05 |
| | | | | ±1.9% |
| (62) Experimental Jacket, MA-1, Polyurethane, Nylon-Wool Lined | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Heavy flight trousers (D-1A) | | | | |
| d. Experimental MA-1 jacket | | | | |
| 1 | 1 | 33.8 | 121.1 - 89.0 | 2.69 |
| 2 | 1 | 42.2 | 127.6 - 89.0 | 2.49 |
| 3 | 1 | 37.7 | 129.7 - 87.0 | <u>2.80</u> |
| | | | | Average: 2.66 |
| | | | | ±0.11 |
| | | | | ±4.1% |
| (63) "Wunderwear" Two-piece Insulated Underwear (after 10 washings) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. "Wunderwear" jacket and trousers, tan color, 3 X 3 construction, dacron insulation, medium | | | | |
| 1 | 1 | 30.7 | 111.3 - 78.0 | 2.65 |
| 2 | 1 | 33.4 | 116.6 - 80.0 | 2.69 |
| 3 | 1 | 34.5 | 121.1 - 82.5 | <u>2.76</u> |
| | | | | Average: 2.70 |
| | | | | ±0.04 |
| | | | | ±1.5% |
| (64) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 4 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Medium woven urethane M-3 jacket and trousers | | | | |
| 1 | 1 | 33.9 | 118.1 - 79.0 | 2.86 |
| 2 | 1 | 32.7 | 119.9 - 84.0 | 2.69 |
| 3 | 1 | 35.0 | 124.7 - 85.0 | <u>2.81</u> |
| | | | | Average: 2.79 |
| | | | | ±0.06 |
| | | | | ±2.2% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (65) Two-piece Navy Flying Suit, MIL-S-18342A (AER) | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Navy flying jacket (40-L) and trousers (34-L) | | | | |
| 1 | 1 | 26.1 | 114.5 - 83.0 | 3.03 |
| 2 | 1 | 39.2 | 117.2 - 78.5 | 2.80 |
| 3 | 1 | 29.5 | 114.0 - 82.0 | <u>2.65</u> |
| | | | | Average: 2.83 |
| | | | | ±0.14 |
| | | | | ±4.9% |
| (66) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 5 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Medium woven urethane M-3 jacket and trousers | | | | |
| 1 | 1 | 21.6 | 105.6 - 80.0 | 2.96 |
| 2 | 1 | 19.7 | 107.0 - 84.0 | 2.91 |
| 3 | 1 | 23.6 | 112.0 - 84.0 | <u>2.97</u> |
| | | | | Average: 2.95 |
| | | | | ±0.02 |
| | | | | ±0.7% |
| (67) RCAF Heavy (Zone VII) Two-piece Flying Suit | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Gray serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. RCAF two-piece flying suit, jacket and trousers zipped together | | | | |
| 1 | 1 | 29.4 | 116.3 - 81.0 | 3.01 |
| 2 | 1 | 29.1 | 115.8 - 81.5 | 2.94 |
| 3 | 1 | 29.7 | 118.1 - 83.0 | <u>2.95</u> |
| | | | | Average: 2.97 |
| | | | | ±0.03 |
| | | | | ±1.0% |

TABLE 3

INSULATION TESTS OF HEAVY (BODY) CLOTHING (more than 3.0 clo)

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (1) Dynel Insulated Coverall, MD-3A | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Dynel insulated coverall (tight fit in shoulders), MD-3A | | | | |
| 1 | 1 | 35.5 | 115.6 - 75.5 | 2.79 |
| 2 | 1 | 30.2 | 116.1 - 76.5 | 3.35 |
| 3 | 1 | 29.1 | 111.5 - 78.0 | <u>2.86</u> |
| | | | | Average: 3.00 |
| | | | | ±0.23 |
| | | | | ±7.6% |
| (2) Standard Impermeable Assembly | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Anti-G suit (G-4B), med.-reg. | | | | |
| c. Ventilating garment, (MA-1) | | | | |
| d. Gray Navy liner, size 46 | | | | |
| e. Anti-exposure suit (MK-4) | | | | |
| f. Flight helmet (R-1) | | | | |
| g. Wool knit gloves | | | | |
| h. Heavy wool socks | | | | |
| i. Bristolite boots | | | | |
| 1 | 1 | 38.5 | 125.5 - 79.5 | 3.04* |
| 2 | 1 | 40.8 | 128.7 - 78.7 | 3.04 |
| 3 | 1 | 41.5 | 130.8 - 81.0 | <u>3.06</u> |
| | | | | Average: 3.04 |
| | | | | ±0.01 |
| | | | | ±0.3% |
| (3) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 7 | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Medium jacket and trousers, M-3 | | | | |
| c. White parka, R-4 | | | | |
| 1 | 1 | 22.9 | 113.3 - 86.0 | 3.08 |
| 2 | 1 | 23.6 | 117.8 - 90.0 | 2.94 |
| 3 | 1 | 25.9 | 122.3 - 89.0 | <u>3.27</u> |
| | | | | Average: 3.10 |
| | | | | ±0.12 |
| | | | | ±3.9% |

*mean effective clo (I_{clo_m})

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_s |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(4) Two-piece Norwegian Survival Kit insulation

- a. Two-piece 50-50 cotton-wool underwear
- b. Gray serge 100% wool shirt (A-1) and trousers (E-1)
- c. Heavy flight jacket (N-2) and trousers (D-1)
- d. Two-piece Norwegian survival kit insulation

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 35.1 | 114.6 - 72.0 | 3.05 |
| 2 | 1 | 33.9 | 116.9 - 75.0 | 3.12 |
| 3 | 1 | 37.0 | 124.9 - 78.0 | <u>3.22</u> |
| Average: | | | | 3.13 |
| | | | | ±0.07 |
| | | | | ±2.2% |

(5) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 6

- a. Two-piece 50-50 cotton-wool underwear
- b. Blue serge 100% wool shirt (A-1) and trousers (E-1)
- c. Heavy jacket and trousers, H-3A

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 18.9 | 100.8 - 77.0 | 3.18 |
| 2 | 1 | 23.1 | 113.1 - 84.0 | 3.19 |
| 3 | 1 | 25.5 | 121.3 - 90.0 | <u>3.09</u> |
| Average: | | | | 3.15 |
| | | | | ±0.04 |
| | | | | ±1.3% |

(6) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 6
(After 10 washings)

- a. Two-piece 50-50 cotton-wool underwear
- b. Blue serge 100% wool shirt (A-1) and trousers (E-1)
- c. Heavy jacket and trousers, H-3A

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 33.5 | 122.2 - 81.5 | 3.06 |
| 2 | 1 | 30.2 | 118.5 - 80.0 | <u>3.24</u> |
| Average: | | | | 3.15 |
| | | | | ±0.09 |
| | | | | ±2.9% |

(7) Experimental Down-Filled Coverall (SAC)

- a. Two-piece 50-50 cotton-wool underwear
- b. Blue serge 100% wool shirt (A-1) and trousers (E-1)
- c. Experimental down-filled coverall

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 34.2 | 126.3 - 83.0 | 3.29 |
| 2 | 1 | 31.1 | 120.4 - 82.0 | 3.12 |
| 3 | 1 | 28.7 | 118.8 - 83.0 | <u>3.15</u> |
| Average: | | | | 3.22 |
| | | | | ±0.11 |
| | | | | ±3.4% |

| Test NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(8) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 7
(after 10 washings)

- a. Two-piece 50-50 cotton-wool underwear
- b. Medium jacket and trousers, M-3
- c. White parka, P-4

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 34.5 | 118.3 - 74.5 | 3.22 |
| 2 | 1 | 37.3 | 124.0 - 76.0 | <u>3.28</u> |
| Average: | | | | 3.25 |
| | | | | ± 0.03 |
| | | | | $\pm 0.9\%$ |

(9) Navy Clothing for Extreme Cold Weather

- a. Two-piece 50-50 cotton-wool underwear
- b. Navy jacket and trousers for intermediate cold weather
- c. Navy jacket and trousers for extreme cold weather

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 26.9 | 115.8 - 81.0 | 3.30 |
| 2 | 1 | 31.6 | 120.2 - 79.5 | <u>3.28</u> |
| Average: | | | | 3.29 |
| | | | | ± 0.01 |
| | | | | $\pm 0.3\%$ |

(10) Encapsulated Seat Survival Clothing (Hagen)

- a. T-shirt and shorts
- b. Flight alert suit, size 40R
- c. Down-filled suit with hood
- d. Wool knit gloves
- e. Down filled mitten
- f. Wool socks

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 27.2 | 111.7 - 75.5 | 3.41 |
| 2 | 1 | 32.5 | 118.4 - 77.0 | 3.24 |
| 3 | 1 | 37.0 | 123.4 - 75.5 | <u>3.30</u> |
| Average: | | | | 3.32* |
| | | | | ± 0.06 |
| | | | | ± 1.82 |

*mean effective clo value (I_{clo_m})

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(11) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 8

- a. Two-piece 50-50 cotton-wool underwear
- b. Heavy jacket and trousers, H-3A
- c. White parka, P-4

| | | | | |
|---|---|------|--------------|---------------|
| 1 | 1 | 23.1 | 109.5 - 79.5 | 3.32 |
| 2 | 1 | 31.2 | 121.5 - 80.5 | <u>3.36</u> |
| | | | | Average: 3.34 |
| | | | | ± 0.02 |
| | | | | $\pm 0.6\%$ |

(12) Ground Crew Climatic Clothing Assembly

- a. Two-piece 50-50 cotton-wool underwear, style 303
- b. Gray serge 100% wool shirt (A-1) and trousers (E-1)
- c. "Jacket 1"
- d. Parka ("Jacket 4") and trousers (wool backed nylon inner shell, wool frieze insulation, neoprene coated rip stop outer shell)

| | | | | |
|---|---|------|--------------|---------------|
| 1 | 1 | 24.7 | 110.4 - 78.0 | 3.35 |
| 2 | 1 | 27.7 | 107.0 - 71.0 | 3.31 |
| 3 | 1 | 30.5 | 111.5 - 70.0 | <u>3.50</u> |
| | | | | Average: 3.35 |
| | | | | ± 0.06 |
| | | | | $\pm 1.8\%$ |

(13) "Wunderwear" Two-piece Insulated Underwear

- a. Two-piece 50-50 cotton-wool underwear
- b. "Wunderwear" jacket and trousers, O.D. color, 4 x 4 construction, Dacron insulation

| | | | | |
|---|---|------|--------------|---------------|
| 1 | 1 | 32.6 | 118.8 - 77.0 | 3.26 |
| 2 | 1 | 41.5 | 128.9 - 76.0 | 3.24 |
| 3 | 1 | 36.9 | 127.1 - 76.5 | <u>3.54</u> |
| | | | | Average: 3.35 |
| | | | | ± 0.13 |
| | | | | $\pm 3.9\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(14) Standard AF Permeable Assembly

- a. Two-piece 50-50 cotton-wool underwear
- b. Anti-G suit (G-4B)
- c. Ventilating garment (MA-1)
- d. Heavy flight jacket with hood (N-3) and trousers (D-1A)
- e. Flight helmet (P-1)
- f. Wool knit gloves
- g. Heavy wool knit socks
- h. Brostolite boots

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 40.7 | 123.0 - 71.0 | 3.30* |
| 2 | 1 | 45.9 | 132.4 - 76.0 | 3.14 |
| 3 | 1 | 36.1 | 127.9 - 75.0 | 3.87 |
| 4 | 1 | 45.4 | 131.8 - 73.5 | <u>3.30</u> |
| Average: 3.40 | | | | ± 0.23 |
| | | | | $\pm 6.8\%$ |

(15) Rayon Acetate Batting Coverall, MD-3A

- a. Two-piece 50-50 cotton-wool underwear
- b. Blue serge 100% wool shirt (A-1) and trousers (A-1)
- c. Rayon Acetate Batting coverall, MD-3A, Medium

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 36.4 | 127.4 - 83.0 | 3.07 |
| 2 | 1 | 30.3 | 122.7 - 80.5 | 3.66 |
| 3 | 1 | 26.5 | 115.6 - 79.0 | <u>3.51</u> |
| Average: 3.41 | | | | ± 0.25 |
| | | | | $\pm 7.3\%$ |

(16) Experimental Heavy Flying Suit (N-2; D-1; 5/16" thick)

- a. Two-piece 50-50 cotton-wool underwear
- b. Gray serge 100% wool shirt (A-1) and trousers (E-1)
- c. Experimental heavy flight jacket (N-2) and trousers (D-1)

| | | | | |
|---------------|---|------|--------------|-------------|
| 1 | 1 | 30.9 | 117.1 - 76.0 | 3.41 |
| 2 | 1 | 33.5 | 120.4 - 76.0 | 3.40 |
| 3 | 1 | 28.9 | 117.5 - 78.0 | <u>3.52</u> |
| Average: 3.44 | | | | ± 0.05 |
| | | | | $\pm 1.5\%$ |

*Mean effective clo (1 clo_m)

| Test NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(17) Experimental Encapsulated Seat Survival Clothing, Style I, Model II

- Two-piece "NORAK" Brynje Underwear, T-shirt, long trousers, med.
- Flight alert suit
- Down-filled one-piece suit with hood
- Down-filled mitten, right hand with trigger finger
- Three pairs heavy wool socks, felt muffle sock and down-filled boots

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 21.9 | 111.9 - 80.0 | 3.57 |
| 2 | 1 | 25.9 | 115.5 - 79.0 | 3.56 |
| 3 | 1 | 29.8 | 120.9 - 80.0 | <u>3.44</u> |
| Average: | | | | 3.52 |
| | | | | ±0.06 |
| | | | | ±1.7% |

(18) Modified Flight Clothing (L.W. Foster Sportswear Co.) Assembly 8

- Two-piece 50-50 cotton-wool underwear
- Heavy jacket and trousers, H-3A
- White parka, P-4

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 32.9 | 126.8 - 82.0 | 3.51 |
| 2 | 1 | 32.9 | 120.9 - 75.0 | <u>3.61</u> |
| Average: | | | | 3.56 |
| | | | | ±0.05 |
| | | | | ±1.4% |

(19) Ground Crew Climatic Clothing Assembly

- Two-piece 50-50 cotton-wool underwear
- Gray serge 100% wool shirt (A-1) and trousers (E-1)
- "Jacket 1"
- "Jacket 2"
- "Jacket 3"
- "Jacket 4" and heavy trousers

Calculated
value: 3.60

(20) Modified Ground Crew Climatic Clothing

- Two-piece 50-50 cotton-wool underwear
- Gray serge 100% wool shirt (A-1) and trousers (E-1)
- Heavy jacket, parka type, (#4), and trousers

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 23.3 | 113.3 - 80.5 | 3.65 |
| 2 | 1 | 29.1 | 121.4 - 80.0 | <u>3.70</u> |
| Average: | | | | 3.68 |
| | | | | ±0.03 |
| | | | | ±0.8% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|----------------|
| (21) British Orally Inflatable Anti-Exposure Suit (P. Frankenstein) inflated to 6-33 cm H ₂ O | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Heavy flight jacket (N-3, large-short) and trousers (D-1) | | | | |
| d. British orally inflatable anti-exposure suit | | | | |
| 1 | 1 | 30.1 | 121.7 - 75.0 | 4.09 |
| 2 | 1 | 34.1 | 123.5 - 75.0 | 3.70 |
| 3 | 1 | 29.2 | 116.7 - 78.0 | <u>3.40</u> |
| | | | | average: 3.73 |
| | | | | ±0.24 |
| | | | | ±6.4% |
| (22) British Orally Inflatable Anti-Exposure Suit (P. Frankenstein) inflated to 2-4 cm H ₂ O | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Heavy flight jacket (N-3, large-short) and trousers (D-1) | | | | |
| d. British orally inflatable anti-exposure suit | | | | |
| 1 | 1 | 28.0 | 120.7 - 80.5 | 3.74 |
| 2 | 1 | 25.3 | 117.2 - 81.0 | <u>3.72</u> |
| | | | | average: 3.73 |
| | | | | ±0.01 |
| | | | | ±0.3% |
| (23) Experimental Encapsulated Seat Survival Clothing, Style II, Model I | | | | |
| a. Two-piece "NORAK" Brynje underwear, T-shirt, long trousers, med. | | | | |
| b. Flight alert suit | | | | |
| c. Down-filled jacket with hood, and trousers | | | | |
| d. Down-filled one finger mitten | | | | |
| e. Two pairs heavy wool socks and down-filled boots | | | | |
| 1 | 1 | 32.8 | 127.2 - 79.0 | 3.74 |
| 2 | 1 | 23.8 | 118.9 - 84.0 | 3.73 |
| 3 | 1 | 26.1 | 116.5 - 76.0 | <u>3.99</u> |
| | | | | average: 3.82* |
| | | | | ±0.11 |
| | | | | ±2.9% |

* Mean effective clo (1 clo_m)

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (24) Experimental Down-Filled Coat, Aqua Colored | | | | |
| a. Cotton T-shirt and shorts | | | | |
| b. One-piece flying suit (K-2B) | | | | |
| c. Experimental down-filled coat | | | | |
| 1 | 1 | 21.3 | 114.1 - 82.0 | 3.96 |
| 2 | 1 | 17.8 | 109.0 - 85.0 | 3.66 |
| 3 | 1 | 19.5 | 115.9 - 85.5 | <u>3.98</u> |
| | | | | Average: 3.84 |
| | | | | ±0.15 |
| | | | | ±3.9% |
| (25) Experimental Down-filled Coat | | | | |
| a. T-shirt and shorts | | | | |
| b. K-2B coverall | | | | |
| c. Experimental down-filled coat | | | | |
| 1 | 1 | 19.5 | 115.0 - 29.5 | 3.98 |
| 2 | 1 | 19.1 | 112.1 - 83.0 | 4.01 |
| 3 | 1 | 17.8 | 109.0 - 85.0 | 3.43 |
| 4 | 1 | 21.3 | 114.1 - 82.0 | <u>3.96</u> |
| | | | | Average: 3.85 |
| | | | | ±0.21 |
| | | | | ±5.5% |
| (26) Commercial Type Parka (N-3) and Trousers (Wm F. Niemi Co., Seattle, Wash). | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Experimental (commercial type) parka (N-3) and trousers | | | | |
| 1 | 1 | 27.3 | 119.3 - 81.0 | 3.63 |
| 2 | 1 | 26.3 | 118.2 - 77.0 | 4.14 |
| 3 | 1 | 25.3 | 118.9 - 78.5 | <u>4.23</u> |
| | | | | Average: 4.00 |
| | | | | ±0.25 |
| | | | | ±6.3% |
| (27) British Orally Inflatable Anti-Exposure Suit (P. Frankenstein) uninflated | | | | |
| a. Two-piece 50-50 cotton-wool underwear | | | | |
| b. Blue serge 100% wool shirt (A-1) and trousers (E-1) | | | | |
| c. Heavy flight jacket (N-3), large-short, and trousers (D-1) | | | | |
| d. British orally inflatable anti-exposure suit | | | | |
| 1 | 1 | 29.4 | 123.3 - 81.0 | 3.75 |
| 2 | 1 | 30.7 | 126.8 - 78.5 | 4.16 |
| 3 | 1 | 34.3 | 133.4 - 79.0 | <u>4.20</u> |
| | | | | Average: 4.04 |
| | | | | ±0.19 |
| | | | | ±4.7% |

| TEST NO. | MODEL | Q_b " | $T_s - T_a$ | I_g |
|---|-------|---------|--------------|-------------|
| (28) Experimental Encapsulated Seat Clothing (Hagan) | | | | |
| a. Two-piece "NORAK" Brynje underwear, T-shirt, long trousers, medium | | | | |
| b. Flight alert suit | | | | |
| c. Down-filled one-piece suit with hood | | | | |
| d. Down-filled mitten, right hand with trigger finger | | | | |
| e. Three pairs heavy wool socks, felt muffle sock and down-filled boots | | | | |
| 1 | 1 | 20.0 | 109.2 - 75.5 | 4.41 |
| 2 | 1 | 25.3 | 114.0 - 77.0 | 3.72 |
| 3 | 1 | 27.3 | 118.2 - 75.0 | <u>4.09</u> |
| Average: | | | | 4.07* |
| | | | | ±0.24 |
| | | | | ±5.9% |

TABLE 4

INSULATION TESTS OF SLEEPING BAGS

| TEST NO. | MODEL | Q_b " | $T_s - T_a$ | I_g |
|--|-------|---------|--------------|-------------|
| (1) Sleeping Bag-Life Raft Combination | | | | |
| a. Nude sitting copper manikin | | | | |
| b. Sleeping bag-life raft combination (Irving Air Chute Co.) | | | | |
| 1 | 2 | 34.8 | 99.7 - 81.0 | 0.86 |
| 2 | 2 | 48.1 | 101.8 - 78.0 | 0.73 |
| 3 | 2 | 55.9 | 110.0 - 85.0 | <u>0.58</u> |
| Average: | | | | 0.72 |
| | | | | ±0.10 |
| | | | | ±14% |
| (2) Sleeping Bag-Life Raft Combination | | | | |
| a. Nude sitting copper manikin wrapped in 28 ft parachute canopy | | | | |
| b. Sleeping bag-life raft combination (Irving Air Chute Co.) | | | | |
| 1 | 2 | 27.1 | 109.1 - 87.0 | 1.72 |
| 2 | 2 | 29.6 | 110.3 - 81.5 | 2.21 |
| 3 | 2 | 32.0 | 109.6 - 81.0 | <u>1.96</u> |
| Average: | | | | 1.96 |
| | | | | ±0.16 |
| | | | | ±8.2% |

* Mean effective clo (I_{clo_m})

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|-------------|-------|-------|-------------|-------|
|-------------|-------|-------|-------------|-------|

(3) Experimental Polyurethane Derivative Filled Sleeping Bag

- a. Man in supine position
- b. Standard AF 50-50 cotton-wool underwear
- c. Experimental sleeping bag

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 26.6 | 116.1 - 80.0 | 3.39 |
| 2 | 1 | 28.9 | 120.8 - 80.5 | 3.51 |
| 3 | 1 | 24.0 | 112.9 - 81.0 | <u>3.31</u> |
| Average: | | | | 3.40 |
| | | | | ±0.07 |
| | | | | ±2.1% |

(4) Survival Sleeping Bag, MC-1

- a. Nude standing copper manikin
- b. MC-1 sleeping bag, 100% downfilled, fluffed 10 times, having been pressure-packed (200 psi)

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 25.2 | 111.6 - 73.5 | 3.97 |
| 2 | 1 | 27.1 | 115.8 - 76.5 | 3.78 |
| 3 | 1 | 35.7 | 128.4 - 78.0 | <u>3.66</u> |
| Average: | | | | 3.80 |
| | | | | ±0.11 |
| | | | | ±2.9% |

(5) Experimental Sleeping Bag, 350 in³

- a. Man in supine position
- b. Two-piece 50-50 cotton-wool underwear
- c. Experimental sleeping bag

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 35.7 | 134.4 - 79.0 | 4.00 |
| 2 | 1 | 31.8 | 120.1 - 80.0 | 4.07 |
| 3 | 1 | 29.4 | 125.6 - 76.0 | <u>4.41</u> |
| Average: | | | | 4.16 |
| | | | | ±0.17 |
| | | | | ±4.1% |

(6) Survival Sleeping Bag, MC-1

- a. Nude standing copper manikin
- b. MC-1 sleeping bag, 100% downfilled, fluffed 10 times

| | | | | |
|----------|---|------|--------------|-------------|
| 1 | 1 | 32.2 | 122.4 - 70.0 | 4.33 |
| 2 | 1 | 34.1 | 127.1 - 71.5 | 4.34 |
| 3 | 1 | 28.9 | 119.8 - 71.5 | <u>4.46</u> |
| Average: | | | | 4.38 |
| | | | | ±0.05 |
| | | | | ±1.1% |

TABLE 5

INSULATION TESTS OF HEADGEAR

| TEST NO. | MODEL | Q_b " | $T_s - T_a$ | I_g |
|--|-------|---------|--------------|-------------|
| (1) Down Filled Detachable Hood, Universal Size (Gray Manufacturing Co.) | | | | |
| 1 | 2 | 22.2 | 101.8 - 84.8 | 1.85 |
| 2 | 2 | 21.5 | 100.7 - 86.0 | 1.56 |
| 3 | 2 | 18.9 | 96.5 - 84.0 | <u>1.49</u> |
| Average: | | | | 1.63 |
| | | | | ± 0.14 |
| | | | | $\pm 8.6\%$ |
| (2) Experimental Flying Helmet MA-3, ventilated | | | | |
| 1 | 2 | 73.8 | 133.0 - 77.0 | 1.79 |
| 2 | 2 | 68.3 | 125.0 - 76.5 | 1.64 |
| 3 | 2 | 50.4 | 114.5 - 74.0 | <u>1.93</u> |
| Average: | | | | 1.79 |
| | | | | ± 0.10 |
| | | | | $\pm 5.6\%$ |
| (3) Experimental Flying Helmet MA-3, non-ventilated | | | | |
| 1 | 2 | 73.8 | 137.0 - 77.5 | 1.96 |
| 2 | 2 | 68.3 | 127.0 - 69.0 | 2.07 |
| 3 | 2 | 50.4 | 119.5 - 70.0 | <u>2.49</u> |
| Average: | | | | 2.17 |
| | | | | ± 0.21 |
| | | | | $\pm 9.7\%$ |
| (4) Flight Helmet MA-3, ventilated | | | | |
| 1 | 2 | 68.3 | 132.0 - 75.0 | 2.03 |
| 2 | 2 | 50.4 | 126.0 - 77.0 | 2.45 |
| 3 | 2 | 59.7 | 129.0 - 76.0 | <u>2.19</u> |
| Average: | | | | 2.22 |
| | | | | ± 0.15 |
| | | | | $\pm 6.8\%$ |
| (5) Flight Helmet MA-3, non-ventilated | | | | |
| 1 | 2 | 68.3 | 134.0 - 73.0 | 2.21 |
| 2 | 2 | 50.4 | 131.0 - 75.5 | 2.85 |
| 3 | 2 | 59.7 | 131.0 - 73.0 | <u>2.45</u> |
| Average: | | | | 2.50 |
| | | | | ± 0.23 |
| | | | | $\pm 9.2\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|------------------------|-------|-------|--------------|-------------|
| (6) Flight Helmet MA-2 | | | | |
| 1 | 2 | 35.7 | 119.0 - 76.5 | 3.13 |
| 2 | 2 | 40.6 | 121.5 - 78.0 | 2.76 |
| 3 | 2 | 49.1 | 120.5 - 75.5 | <u>2.28</u> |
| Average: | | | | 2.72 |
| | | | | ± 0.23 |
| | | | | $\pm 8.5\%$ |

TABLE 6

INSULATION TESTS OF HANDGEAR

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|-------------|
| (1) Inner Rubber Glove (MC-2 Glove Assembly) | | | | |
| 1 | 1 | 159.7 | 105.5 - 96.3 | 0.18 |
| 2 | 1 | 177.3 | 110.0 - 99.3 | 0.19 |
| 3 | 1 | 193.1 | 109.7 - 97.1 | <u>0.20</u> |
| Average: | | | | 0.19 |
| | | | | ± 0.01 |
| | | | | $\pm 5.3\%$ |
| (2) U.S. Navy Five Finger Glove, A 461-1 | | | | |
| 1 | 1 | 122.9 | 99.5 - 90.2 | 0.24 |
| 2 | 1 | 140.4 | 100.0 - 89.4 | 0.23 |
| 3 | 1 | 159.7 | 104.2 - 93.5 | <u>0.21</u> |
| Average: | | | | 0.23 |
| | | | | ± 0.01 |
| | | | | $\pm 4.3\%$ |
| (3) Brown Leather Glove, Style HG 123, Size 10 | | | | |
| 1 | 1 | 163.2 | 101.3 - 88.8 | 0.27 |
| 2 | 1 | 140.4 | 98.5 - 87.3 | 0.25 |
| 3 | 1 | 175.5 | 107.5 - 96.1 | <u>0.26</u> |
| Average: | | | | 0.26 |
| | | | | ± 0.01 |
| | | | | $\pm 3.8\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|---------------|---------------|
| (4) Grey Wool Glove (#8, New Pattern, Fotiaire Glove, Inc.) | | | | |
| 1 | 1 | 106.1 | 104.0 - 93.6 | 0.30 |
| 2 | 1 | 122.9 | 108.5 - 96.1 | 0.31 |
| 3 | 1 | 142.8 | 113.0 - 98.3 | 0.32 |
| | | | | Average: 0.31 |
| | | | | ±0.01 |
| | | | | ±3.2% |
| (5) Glove Set, MA-1 | | | | |
| a. Knitted wool insert | | | | |
| b. Leather shell | | | | |
| 1 | 1 | 136.8 | 113.0 - 97.7 | 0.34 |
| 2 | 1 | 167.1 | 115.0 - 98.5 | 0.32 |
| 3 | 1 | 175.5 | 119.3 - 100.1 | 0.33 |
| | | | | Average: 0.33 |
| | | | | ±0.01 |
| | | | | ±3.0% |
| (6) One-Finger Leather Mitten (#10 New Pattern, Fotiaire Glove Inc.) Chamois lined, Size large | | | | |
| 1 | 1 | 140.8 | 116.5 - 99.7 | 0.37 |
| 2 | 1 | 122.9 | 112.0 - 95.8 | 0.40 |
| 3 | 1 | 108.7 | 108.5 - 94.2 | 0.40 |
| | | | | Average: 0.39 |
| | | | | ±0.01 |
| | | | | ±2.6% |
| (7) One-Finger Mitten, Aluminized Fabric (Asbestos) (#9 New Pattern- 3M Brand, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 144.8 | 122.0 - 103.7 | 0.39 |
| 2 | 1 | 124.5 | 118.5 - 102.0 | 0.41 |
| 3 | 1 | 106.1 | 112.5 - 98.0 | 0.42 |
| | | | | Average: 0.41 |
| | | | | ±0.01 |
| | | | | ±2.4% |
| (8) One-Finger Leather Mitten, Insulation: 2 Byrd Cloth, 1 Rubber Layer (#5 New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 106.1 | 109.0 - 93.6 | 0.45 |
| 2 | 1 | 124.4 | 113.0 - 95.7 | 0.43 |
| 3 | 1 | 140.4 | 118.0 - 97.9 | 0.44 |
| | | | | Average: 0.44 |
| | | | | ±0.01 |
| | | | | ±2.3% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|-------------|
| (9) One-Finger Leather Mitten, Insulation: 2 Glass Cloth, 1 Rubber Layer, uninflated (#6 Old Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 140.4 | 117.0 - 98.1 | 0.42 |
| 2 | 1 | 122.9 | 112.0 - 94.2 | 0.45 |
| 3 | 1 | 106.1 | 109.5 - 94.0 | <u>0.45</u> |
| Average: | | | | 0.44 |
| | | | | ±0.01 |
| | | | | ±2.3% |
| (10) One-Finger Leather Mitten, Insulation: 2 Glass Cloth, 1 Rubber Layer, fully inflated (#6 Old Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 106.1 | 111.5 - 96.1 | 0.45 |
| 2 | 1 | 124.5 | 115.5 - 97.0 | 0.46 |
| 3 | 1 | 149.9 | 116.5 - 95.1 | <u>0.46</u> |
| Average: | | | | 0.46 |
| | | | | ±0.00 |
| | | | | ±0.0% |
| (11) One-Finger Leather Mitten, Insulation 2 Byrd Cloth, 1 Rubber Layer (#1 New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 105.3 | 109.5 - 93.2 | 0.48 |
| 2 | 1 | 122.8 | 115.0 - 95.7 | 0.48 |
| 3 | 1 | 140.4 | 120.7 - 98.2 | <u>0.49</u> |
| Average: | | | | 0.48 |
| | | | | ±0.00 |
| | | | | ±0.0% |
| (12) One-Finger Leather Mitten, Insulation: 2 Aluminized Rayon, 1 Rubber Layer (#3 New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 105.3 | 106.0 - 88.2 | 0.52 |
| 2 | 1 | 122.9 | 113.0 - 90.2 | 0.57 |
| 3 | 1 | 168.2 | 118.0 - 93.2 | <u>0.46</u> |
| Average: | | | | 0.52 |
| | | | | ±0.04 |
| | | | | ±7.8% |
| (13) One-Finger Leather Mitten, Insulation: 2 Glass Cloth, 1 Rubber Layer (#6 Old Pattern, Fotiaire Glove Inc.), partially inflated | | | | |
| 1 | 1 | 159.2 | 124.5 - 96.7 | 0.54 |
| 2 | 1 | 140.8 | 120.0 - 94.5 | 0.56 |
| 3 | 1 | 124.4 | 116.0 - 93.7 | <u>0.55</u> |
| Average: | | | | 0.55 |
| | | | | ±0.01 |
| | | | | ±1.8% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|-------------|
| (14) Wool Lined Leather Glove for Industrial Purpose | | | | |
| 1 | 3 | 71.7 | 91.0 - 77.6 | 0.58 |
| 2 | 3 | 84.6 | 95.0 - 80.0 | 0.55 |
| 3 | 3 | 96.0 | 100.0 - 82.5 | <u>0.56</u> |
| Average: | | | | 0.56 |
| | | | | ±0.01 |
| | | | | ±1.8% |
| (15) One-Finger Leather Mitten, Insulation: 2 Aluminized Rayon, 1 Rubber Layer (#7 New Pattern, Fotiaire Glove Inc.) Uninflated | | | | |
| 1 | 1 | 106.1 | 108.5 - 89.3 | 0.56 |
| 2 | 1 | 122.4 | 115.0 - 91.6 | 0.59 |
| 3 | 1 | 140.8 | 121.0 - 95.2 | <u>0.57</u> |
| Average: | | | | 0.57 |
| | | | | ±0.01 |
| | | | | ±1.8% |
| (16) One-Finger Leather Mitten, Insulation: 1 Byrd Cloth, 1 Asbestos, 1 Rubber Layer (#4 New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 140.8 | 115.0 - 89.3 | 0.56 |
| 2 | 1 | 122.8 | 112.0 - 89.2 | 0.57 |
| 3 | 1 | 105.3 | 109.0 - 88.4 | <u>0.60</u> |
| Average: | | | | 0.58 |
| | | | | ±0.02 |
| | | | | ±0.4% |
| (17) Experimental Down-filled 2-Finger Mitten for Encapsulated Seat Survival Clothing, Style II, Model I | | | | |
| 1 | 1 | 112.3 | 108.8 - 86.0 | 0.63 |
| 2 | 1 | 76.5 | 108.3 - 90.4 | 0.57 |
| 3 | 1 | 79.0 | 105.5 - 90.8 | <u>0.57</u> |
| Average: | | | | 0.59 |
| | | | | ±0.03 |
| | | | | ±5.1% |
| (18) Navy Anti-Contact Mittens | | | | |
| 1 | 1 | 140.0 | 120.5 - 94.0 | 0.58 |
| 2 | 1 | 110.6 | 113.0 - 90.9 | 0.62 |
| 3 | 1 | 122.9 | 117.0 - 93.1 | <u>0.60</u> |
| Average: | | | | 0.60 |
| | | | | ±0.01 |
| | | | | ±1.7% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (19) One-Finger Leather Mitten, Insulation: 2 Aluminized Rayon, 1 Rubber Layer, fully inflated (Fotiaire Glove Inc. #7 New Pattern) | | | | |
| 1 | 1 | 140.8 | 121.0 - 94.1 | 0.59 |
| 2 | 1 | 122.9 | 115.0 - 91.4 | 0.59 |
| 3 | 1 | 106.1 | 112.0 - 90.3 | 0.63 |
| | | | | Average: 0.60 |
| | | | | ±0.02 |
| | | | | ±3.3% |
| (20) One-Finger Leather Mitten, Insulation 1 Byrd Cloth, 1 Aluminized Rayon, 1 Rubber layer (#2 New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 140.4 | 119.0 - 92.3 | 0.58 |
| 2 | 1 | 122.4 | 118.0 - 92.8 | 0.62 |
| 3 | 1 | 105.3 | 108.5 - 87.7 | 0.61 |
| | | | | Average: 0.60 |
| | | | | ±0.02 |
| | | | | ±3.3% |
| (21) One-Finger Leather Mitten, Insulation: 2 Aluminized Rayon, 1 rubber layer, partially inflated (#7 New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 106.1 | 114.0 - 91.9 | 0.64 |
| 2 | 1 | 122.8 | 118.5 - 92.6 | 0.65 |
| 3 | 1 | 144.9 | 122.5 - 93.8 | 0.61 |
| | | | | Average: 0.63 |
| | | | | ±0.02 |
| | | | | ±3.2% |
| (22) One-Finger Leather Mitten, Insulation: 2 Sunbak Cloth, 1 Rubber layer (#8a New Pattern, Fotiaire Glove Inc.) | | | | |
| 1 | 1 | 103.5 | 113.8 - 89.8 | 0.72 |
| 2 | 1 | 122.9 | 119.5 - 92.4 | 0.68 |
| 3 | 1 | 140.4 | 126.0 - 95.0 | 0.68 |
| | | | | Average: 0.69 |
| | | | | ±0.02 |
| | | | | ±2.9% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (23) Experimental Mitten for Encapsulated Seat Survival Clothing | | | | |
| a. Leather Glove, B-3A | | | | |
| b. Down-filled experimental mitten for encapsulated seat survival clothing | | | | |
| 1 | 1 | 121.1 | 120.0 - 89.8 | 0.77 |
| 2 | 1 | 142.2 | 124.0 - 92.0 | 0.69 |
| 3 | 1 | 121.1 | 130.3 - 90.9 | <u>0.86</u> |
| | | | | Average: 0.79 |
| | | | | ± 0.06 |
| | | | | $\pm 7.6\%$ |
| (24) Anti-Exposure Suit Mitten with Wool Insert for Air-Inflatable Anti-Exposure Suit | | | | |
| 1 | 2 | 99.0 | 115.7 - 85.2 | 0.95 |
| 2 | 2 | 89.2 | 113.5 - 89.7 | 0.82 |
| 3 | 2 | 82.8 | 113.0 - 92.3 | <u>0.77</u> |
| | | | | Average: 0.85 |
| | | | | ± 0.07 |
| | | | | $\pm 8.2\%$ |
| (25) Standard AF Mitten Assembly, N-4 | | | | |
| a. Wool knit five-finger glove | | | | |
| b. Leather shell, Spec. 3142, Type A-11A, medium | | | | |
| c. N-4 (1) Inner blue mitten, blanket material | | | | |
| (2) Outer leather (palm) and fur (back) mitten | | | | |
| 1 | 1 | 109.0 | 122.0 - 87.1 | 0.95 |
| 2 | 1 | 105.8 | 121.0 - 87.6 | 0.98 |
| 3 | 1 | 122.8 | 124.0 - 90.1 | 0.85 |
| 4 | 1 | 133.2 | 134.0 - 92.4 | 0.97 |
| 5 | 1 | 108.6 | 121.0 - 86.8 | <u>0.97</u> |
| | | | | Average: 0.94 |
| | | | | ± 0.07 |
| | | | | $\pm 7.4\%$ |
| (26) Standard Mitten for MD-1 | | | | |
| a. Wool knit insert | | | | |
| b. Nylon-neoprene outer mitten | | | | |
| 1 | 1 | 122.8 | 129.7 - 80.0 | 0.75 |
| 2 | 1 | 101.9 | 128.8 - 79.0 | 0.98 |
| 3 | 1 | 87.7 | 125.5 - 80.0 | 1.09 |
| 4 | 1 | 70.2 | 117.0 - 84.0 | 0.95 |
| 5 | 1 | 79.0 | 124.0 - 85.0 | <u>1.02</u> |
| | | | | Average: 0.96 |
| | | | | ± 0.09 |
| | | | | $\pm 9.4\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|--|-------|-------|--------------|---------------|
| (27) Experimental Down-Filled Aqua-Colored Mitten | | | | |
| 1 | 1 | 106.1 | 128.0 - 92.5 | 1.03 |
| 2 | 1 | 122.4 | 135.5 - 94.5 | 1.03 |
| 3 | 1 | 108.1 | 126.0 - 92.2 | <u>0.97</u> |
| | | | | Average: 1.01 |
| | | | | ±0.03 |
| | | | | ±3.0% |
| (28) Experimental Down-filled Mitten for Encapsulated Seat Survival Clothing, Style I, Model II | | | | |
| 1 | 2 | 87.6 | 115.7 - 85.3 | 1.07 |
| 2 | 2 | 79.5 | 112.5 - 85.2 | 1.06 |
| 3 | 2 | 66.5 | 105.5 - 83.2 | <u>1.04</u> |
| | | | | Average: 1.06 |
| | | | | ±0.01 |
| | | | | ±0.9% |
| (29) Experimental Curved One-Finger Bristolite Sealed Insulation Glove, Type 2, medium | | | | |
| 1 | 1 | 92.9 | 126.0 - 91.0 | 1.16 |
| 2 | 1 | 105.0 | 131.0 - 93.6 | 1.09 |
| 3 | 1 | 87.7 | 122.0 - 86.8 | 1.24 |
| 4 | 1 | 114.0 | 127.0 - 88.5 | 1.04 |
| 5 | 1 | 105.2 | 131.3 - 92.6 | <u>1.13</u> |
| | | | | Average: 1.13 |
| | | | | ±0.05 |
| | | | | ±4.4% |
| (30) Anti-Exposure Suit Mitten, Attached to Air-Inflatable Anti-Exposure Suit MD-2, Spacer insulated | | | | |
| 1 | 1 | 107.1 | 127.3 - 88.4 | 1.12 |
| 2 | 1 | 91.2 | 119.3 - 86.7 | 1.10 |
| 3 | 1 | 73.7 | 113.5 - 85.9 | <u>1.16</u> |
| | | | | Average: 1.13 |
| | | | | ±0.02 |
| | | | | ±1.8% |

| TEST NO. | MODEL | q_b | $T_s - T_g$ | I_g |
|--|-------|-------|--------------|-------------|
| (31) Leather Flying Gloves, Wool Insulation, Rubberized Fabric Gauntlets, J.M. Rubins & Sons | | | | |
| 1 | 1 | 84.2 | 120.3 - 88.2 | 1.18 |
| 2 | 1 | 96.5 | 126.8 - 91.2 | 1.14 |
| 3 | 1 | 107.1 | 129.8 - 91.5 | <u>1.10</u> |
| Average: | | | | 1.14 |
| | | | | ± 0.03 |
| | | | | $\pm 2.6\%$ |

TABLE 7

INSULATION TESTS OF FOOTGEAR

| TEST NO. | MODEL | q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|-------------|
| (1) Experimental (Sealed Insulation) Leather Boot, Size 90 1/2 | | | | |
| a. Medium wool sock | | | | |
| b. Experimental leather boot | | | | |
| 1 | 2 | 78.2 | 99.2 - 78.0 | 0.34 |
| 2 | 2 | 63.6 | 99.8 - 77.0 | 0.35 |
| 3 | 2 | 74.8 | 96.7 - 76.0 | 0.35 |
| 4 | 2 | 88.4 | 97.2 - 72.0 | 0.38 |
| 5 | 2 | 102.1 | 103.2 - 75.0 | <u>0.35</u> |
| Average: | | | | 0.35 |
| | | | | ± 0.01 |
| | | | | $\pm 2.9\%$ |
| (2) Experimental Alert Flight Boot, Full Leather Sole with Patch of Rubber Cemented to Outside Sole, Size 9D | | | | |
| 1 | 2 | 125.9 | 98.0 - 83.4 | 0.36 |
| 2 | 2 | 149.6 | 107.7 - 90.3 | 0.36 |
| 3 | 2 | 127.1 | 103.5 - 90.3 | <u>0.32</u> |
| Average: | | | | 0.35 |
| | | | | ± 0.02 |
| | | | | $\pm 5.7\%$ |
| (3) Experimental Alert Flight Boot, Leather Midsole and full Composition Rubber and Cord outer Sole, Size 10-1/2C | | | | |
| 1 | 2 | 126.1 | 104.0 - 89.2 | 0.36 |
| 2 | 2 | 149.5 | 111.0 - 93.7 | 0.36 |
| 3 | 2 | 126.1 | 102.5 - 87.5 | <u>0.37</u> |
| Average: | | | | 0.36 |
| | | | | ± 0.01 |
| | | | | $\pm 2.8\%$ |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|-------------|
| (4) Experimental Alert Flying Suit, Leather Midsole and Synthetic Sponge Rubber Outsole of approximately 2 times the thickness of Leather Midsole, Size 10-1/2C | | | | |
| 1 | 2 | 127.1 | 108.0 - 93.2 | 0.36 |
| 2 | 2 | 149.2 | 114.0 - 96.3 | 0.37 |
| 3 | 2 | 126.1 | 111.5 - 95.8 | <u>0.38</u> |
| Average: | | | | 0.37 |
| | | | | ±0.01 |
| | | | | ±2.7% |
| (5) Experimental Flying Boot, Zipper in Center, Lacing on both Sides of Zipper, Insulated, Size 11E (Dahner Tank Boots) | | | | |
| 1 | 2 | 102.2 | 100.2 - 70.5 | 0.40 |
| 2 | 2 | 113.2 | 103.0 - 70.0 | 0.40 |
| 3 | 2 | 125.9 | 111.7 - 75.0 | <u>0.40</u> |
| Average: | | | | 0.40 |
| | | | | ±0.00 |
| | | | | ±0.0% |
| (6) MC-2 Boot, Zipper, Laced Leather Boot, Size 10 | | | | |
| 1 | 2 | 112.2 | 107.3 - 91.7 | 0.43 |
| 2 | 2 | 138.3 | 114.3 - 96.3 | 0.40 |
| 3 | 2 | 123.4 | 108.3 - 90.7 | <u>0.44</u> |
| Average: | | | | 0.42 |
| | | | | ±0.02 |
| | | | | ±4.8% |
| (7) Boot, Combat, Leather, Flying, USAF MIL-13-11077A, Size 9D | | | | |
| a. Medium weight wool sock | | | | |
| b. Boot, leather, combat, flying | | | | |
| 1 | 2 | 75.8 | 92.0 - 80.5 | 0.46 |
| 2 | 2 | 100.0 | 101.8 - 87.5 | 0.44 |
| 3 | 2 | 89.5 | 101.7 - 88.8 | 0.45 |
| 4 | 2 | 102.0 | 105.7 - 91.0 | <u>0.45</u> |
| Average: | | | | 0.45 |
| | | | | ±0.01 |
| | | | | ±2.2% |
| (8) Felt Alert Boot (Chippewa Co.), Size 11D | | | | |
| a. Cushion sole sock | | | | |
| b. Felt alert boot, 11D, commercial version for SAC Proc., Chippewa Co. | | | | |
| 1 | 2 | 100.9 | 99.0 - 77.8 | 0.65 |
| 2 | 2 | 113.2 | 102.0 - 80.1 | 0.60 |
| 3 | 2 | 124.2 | 104.5 - 80.6 | 0.59 |
| 4 | 2 | 150.0 | 113.0 - 82.9 | <u>0.62</u> |
| Average: | | | | 0.61 |
| | | | | ±0.02 |
| | | | | ±3.3% |

| TEST NO. | MODEL | Q_b | $T_s - T_a$ | I_g |
|---|-------|-------|--------------|---------------|
| (9) Experimental Down-filled Boot for Encapsulated Seat Survival Clothing Style II, Model I (No underlying socks) | | | | |
| 1 | 4 | 55.1 | 107.5 - 81.5 | 1.46 |
| 2 | 4 | 48.5 | 104.2 - 78.9 | 1.61 |
| 3 | 4 | 61.7 | 111.2 - 83.0 | 1.41 |
| 4 | 4 | 71.7 | 118.8 - 86.0 | <u>1.41</u> |
| | | | | Average: 1.47 |
| | | | | ±0.08 |
| | | | | ±5.4% |
| (10) White Rubber Boot (Hood) as Worn in Cold Water Immersion Tests | | | | |
| a. Light weight wool socks | | | | |
| b. White Rubber Boot (Hood), size 8R | | | | |
| 1 | 2 | 73.5 | 124.2 - 85.3 | 1.64 |
| 2 | 2 | 67.3 | 118.0 - 82.8 | 1.62 |
| 3 | 2 | 56.1 | 113.2 - 82.6 | <u>1.69</u> |
| | | | | Average: 1.65 |
| | | | | ±0.03 |
| | | | | ±1.8% |
| (11) Experimental Down-filled Boot for Encapsulated Seat Survival Clothing, Style I, Model II | | | | |
| 1 | 4 | 48.5 | 111.3 - 83.5 | 1.77 |
| 2 | 4 | 57.3 | 117.8 - 84.6 | 1.79 |
| 3 | 4 | 67.3 | 124.7 - 85.6 | <u>1.79</u> |
| | | | | Average: 1.78 |
| | | | | ±0.01 |
| | | | | ±0.6% |
| (12) Experimental Down-filled Boot for Encapsulated Seat Survival Clothing (no underlying socks) | | | | |
| 1 | 2 | 113.4 | 143.6 - 84.5 | 1.61 |
| 2 | 2 | 74.7 | 126.7 - 80.8 | 1.89 |
| 3 | 2 | 87.2 | 138.3 - 83.7 | 1.93 |
| 4 | 2 | 62.3 | 125.3 - 83.7 | 2.06 |
| 5 | 2 | 58.5 | 119.0 - 82.8 | <u>1.91</u> |
| | | | | Average: 1.88 |
| | | | | ±0.11 |
| | | | | ±5.9% |

SECTION 2

REVISED AND EXTENDED CATALOG OF CLOTHING ITEMS

A. LIGHT (BODY) CLOTHING (0.0 - 1.5 clo)

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE | |
|---|----------------------|---------|--------|-----------|-----------------|--------------|-----------|--------|
| | | | | | | | PART | PAGE |
| | | | LBS | IN | CLO | | | |
| (1) ONE-PIECE UNDERWEAR | | | | | | | | |
| 80-20 cotton-wool under- wear | Vassar | 36 | 0.45 | 0.02 | 0.3 | 0.067 | I | 8 |
| Thermistor Suit, combed cotton | | 28-reg. | | | 0.3 | | V | 5 |
| 50-50 cotton-wool ther- mocouple underwear | Revere | large | | | 0.5 | | II III | 4 7 |
| Leatherskin underwear, short sleeves | | | | | 1.0 | | III | 10 |
| (2) TWO-PIECE UNDERWEAR | | | | | | | | |
| Cotton underwear | Munsing | 46;34 | 0.59 | 0.02 | 0.2 | 0.100 | IV | 7 |
| Thermal underwear | Allan-A Insulaire | 7 | 1.40 | 0.085 | 0.3 | 0.283 | V | 5 |
| Two-layer insulated underwear, T-shirt, trousers | DUOFOLD | 42;36-L | 0.83 | 0.075 | 0.4 | 0.188 | V | 5 |
| Brynje underwear | VALHALLA | large | 0.75 | 0.07 | 0.4 | 0.175 | V | 6 |
| Brynje underwear | NORAK | medium | 0.99 | 0.105 | 0.4 | 0.263 | V | 6 |
| 80-20 cotton-wool T- shirt and briefs | | | 0.39 | 0.03 | 0.5 | 0.060 | III | 12 |
| Standard AF 50-50 cot- ton-wool underwear | | med. | 1.87 | 0.09 | 0.5 | 0.180 | V | 7 |
| Cotton-wool underwear | Style 303 | " | 1.19 | 0.08 | 0.5 | 0.160 | V | 7 |
| 50-40-10 vicara-cotton- nylon underwear | V-1S;V-1D | " | 1.87 | 0.06 | 0.5 | 0.120 | V | 7 |
| Navy thermal underwear | Allan-A Insulaire | " | 1.73 | 0.09 | 0.5 | 0.180 | V | 7 |
| Brynje underwear | IDEAL | large | 0.63 | 0.085 | 0.5 | 0.170 | V | 6 |
| 50-50 orlon-cotton underwear | Hanes | " | | | 0.6 | | III | 7 |
| 50-50 vicara-cotton underwear | Onita | " | | | 0.6 | | III | 8 |
| 50-40-10 vicara-cotton- nylon underwear | Gibbs | " | | | 0.6 | | III | 8 |
| Heavy zone cotton-wool underwear | Style 303 | " | | | 0.6 | | V | 8 |
| 35-15 vicara-nylon underwear | V-2S;V-2D | " | 1.72 | 0.06 | 0.6 | 0.100 | V | 8 |
| Underwear with bulk orlon between two cotton layers | Style 301 | " | 1.34 | 0.09 | 0.6 | 0.150 | V | 8 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE PART | PAGE |
|--|----------------------|------------|--------|-----------|-----------------|--------------|-------------------|----------------|
| | | | LBS. | IN. | CL | | | |
| Underwear with vicara- nylon between two cotton layers | Style 302 | " | 1.74 | 0.085 | 0.6 | 0.142 | V | 8 |
| 50-50 cotton-wool paja- ma type underwear, O.D | QM | " | 1.52 | 0.07 | 0.7 | 0.100 | III | 8 |
| 50-50 cotton-wool underwear | XB-67 | large | | | 0.9 | | I | 8 |
| Cotton, pajama type, waffle weave, underwear | | medium | | | 0.9 | | II | 4 |
| Cotton, double layer, pajama type under- wear, yellow | | medium | | | 0.9 | | II | 4 |
| Standard Navy, waffle underwear | A-1 | medium | | | 0.9 | | V | 18 |
| Curon insulated underwear | Set Snug | medium | 1.77 | 0.115 | 1.0 | 0.115 | V | 11 |
| (3) ANTI-G SUITS | | | | | | | | |
| Standard anti-G suit | G-4A | large-reg. | | | 0.6 | | III | 9 |
| Experimental anti-G suit | G-4A Dupont | large-reg. | | | 0.6 | | III | 9 |
| Standard anti-G suit | G-4B | med-reg. | 4.13 | | 1.1 | | IV | 9 |
| (4) EXPOSURE SUITS | | | | | | | | |
| Standard anti-exposure suit | MD-1 | med.-reg. | 6.41 | | 0.4 | | IV | 24 |
| Vapor permeable Navy anti-exposure suit | Mk-III | | | | 0.4 | | III | 16 |
| Exp. inflatable exposure suit | MD-2 | | 9.70 | 0.16 | 0.8 | 0.200 | V | 9 |
| Experimental flotation and survival suit after wetting and drying | Celanese Corp. | med.-reg. | | | 0.9 | | IV | 14 |
| Continuous wear expo- sure suit | R-2 | | | | 0.9 | | III III III | 12 18 19 |
| British orally inflat- able exposure suit not inflated | P. Fran- kenstein | | | | 1.0 1.1 | | V V | 11 11 |
| inflated (3-4 cm H ₂ O) | | | | | | | | |
| Experimental flotation and survival suit before wetting | Celanese Corp. | med.-reg. | | | 1.2 | | IV | 16 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I Ratio | REFERENCE PART | PAGE |
|--|-----------------------|-----------|--------|-----------|-----------------|--------------|-------------------|------|
| | | | LBS. | IN. | CLO | | | |
| Arctic emergency survival parka, 1/2 in. wool pile interlining | N-3 | | | | 1.2 | | II | 11 |
| Standard two-layer, wool backed nylon coverall | MD-3A | med.-reg. | 3.58 | 0.18 | 1.4 | 0.129 | IV | 17 |
| (5) LINERS | | | | | | | | |
| Experimental one-piece exposure suit liner | D.Clark | medium | | | 0.6 | | III | 11 |
| Experimental two-piece exposure suit liner | D. Clark | med.-reg. | | | 0.6 | | IV | 10 |
| "Zero Wear" two-piece polyurethane(Curon) liner tan | Curtiss-Wright | | 1.39 | 0.14 | 1.2 | 0.117 | V | 15 |
| red | " | | 1.43 | 0.13 | 1.2 | 0.108 | V | 16 |
| Two-piece polyther urethane foam liner | U.S.Rubber | " | | 0.25 | 1.2 | 0.208 | V | 23 |
| Two-piece Dynel liner | U.S.Ruber | " | | 0.26 | 1.2 | 0.218 | V | 23 |
| "Skagway" jacket and trousers | Urow 3497 | medium | 1.69 | 0.155 | 1.3 | 0.119 | V | 17 |
| "Weatherall" two-piece 30-70 acetate-Virgin wool liner | Outdoor Products | med.-reg. | 2.31 | 0.23 | 1.4 | 0.164 | V | 14 |
| "Polar Wear" two-piece 100% Dacron liner | Dormer-Werner, Inc. | " | 1.90 | 0.255 | 1.4 | 0.182 | V | 26 |
| "Wunderwear" two-piece 100% Dacron liner, tubular quilted | Shelly Co. | " | 1.75 | 0.27 | 1.4 | 0.193 | V | 22 |
| "Satellite" jacket and trousers | Outwear T-100 | medium | 1.92 | 0.245 | 1.4 | 0.175 | V | 19 |
| Two-piece insulated underwear | Dormer-Werner 46 | medium | 1.85 | 0.18 | 1.4 | 0.129 | V | 19 |
| Blue liner, quilted, for use with Mk-IV anti-exposure suit | Navy | 46-reg. | 5.08 | 0.53 | 1.5 | 0.353 | III | 13 |
| "Comfortall" two-piece liner | Budd Ins. Prod., Inc. | med.-reg. | 3.05 | 0.26 | 1.5 | 0.173 | V | 25 |
| "Weatherall" jacket and trousers | Outdoor Products | med-reg. | 2.31 | 0.29 | 1.5 | 0.193 | IV | 19 |
| (6) ONE-PIECE COVERALLS | | | | | | | | |
| Standard coverall | A-4 | medium | | | 0.3 | | I | 9 |
| Water barrier coverall | | | 1.80 | 0.01 | 0.3 | 0.033 | V | 20 |
| Flight alert suit | | medium | 2.83 | 0.03 | 0.5 | 0.075 | V | 10 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | | INSU- LATION | T/I RATIO | REFERENCE | |
|---|-----------|--------|--------|-----------|-----|-----------------|--------------|-----------|------|
| | | | | lbs. | in. | | | PART | PAGE |
| Experimental coverall | Sunbak | medium | | | | 0.7 | | I | 9 |
| Gabardine coverall | A-4 | medium | | | | 0.9 | | I | 8 |
| Trilock Spacer Coverall | | | | | | 1.0 | | V | 26 |
| Spacer Insulated Coverall | P/N S-885 | | 4.10 | 0.16 | | 1.1 | 0.146 | V | 15 |
| Experimental Navy outer coverall | WN-1 | large | | | | 1.2 | | II | 12 |
| Experimental two-layer wool-backed nylon coverall | ABD-3A | medium | 3.92 | 0.18 | | 1.4 | 0.129 | IV | 17 |

(7) ONE-PIECE FLYING SUITS

| | | | | | | | | | |
|---|---------------------|------------|------|------|--|-----|-------|-----|----|
| Blue worsted wool gabar- dine (men's) flying suit | L-1A | med.-reg. | | | | 0.5 | | IV | 8 |
| Nylon, Dobby weave flying suit | K-2A | med.-reg. | | | | 0.6 | | III | 8 |
| Byrd Cloth flying suit | K-2B | med.-reg. | | 0.01 | | 0.6 | 0.017 | III | 8 |
| Cotton-nylon, Dobby weave, very light flying suit | K-2C | med.-reg. | | | | 0.6 | | III | 9 |
| Light flying suit (L.W. Foster) | SFS-1 | | 2.13 | 0.01 | | 0.6 | 0.017 | V | 12 |
| Quilted flying suit | AB-78 | med.-reg. | | | | 0.8 | | II | 5 |
| Alpaca wool flying suit | | | | | | 0.9 | | II | 8 |
| Summer flying suit | AN-S-31A | med.-large | | | | 1.0 | | I | 8 |
| Modified B-78, 1/8" durolite | B-78 U.S. Rubber | med.-reg. | 4.92 | 0.16 | | 1.0 | 0.160 | V | 27 |
| Cotton flying suit | K-2 | large-reg. | | | | 1.1 | | IV | 10 |
| Experimental flying suit | CWU-1/P | med.-reg. | | | | 1.2 | | V | 17 |
| Experimental flying suit with 136 x 69 nylon- taffeta liner | CWU-1/P | med.-reg. | | | | 1.2 | | V | 17 |
| Experimental flying suit with nylon-millium liner | | med.-reg. | | | | 1.2 | | V | 18 |
| Navy electrically heated flying suit | Colvi- nex | med.-reg. | | | | 1.3 | | III | 9 |
| Experimental flying suit with 130 x 60 rayon-sateen liner | CWU-1/P | med.-reg. | | | | 1.3 | | V | 20 |
| Experimental flying suit with rayon-sateen- millium liner | CWU-1/P | med.-reg. | | | | 1.3 | | V | 21 |
| Experimental flying suit with neoprene coated nylon rip stop, type I liner | CWU-1/P | med.-reg. | | | | 1.4 | | V | 23 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE | PAGE |
|---|-----------------|------------|--------|-----------|-----------------|--------------|-----------|------|
| | | | | | | | | |
| | | | LBS. | IN. | CLO | | | |
| (8) TWO-PIECE FLYING SUITS | | | | | | | | |
| Gray cotton shirt and trousers | | med.-reg. | 1.72 | 0.035 | 0.6 | 0.058 | V | 10 |
| Gray serge 100% wool shirt and trousers | A-1; E-1 | med.-reg. | 3.56 | 0.03 | 0.6 | 0.050 | V | 13 |
| OD shirt and trousers | QM | med.-reg. | | | 0.7 | | I | 8 |
| Blue serge 100% wool shirt and trousers | A-1; E-1 | med.-reg. | 3.75 | 0.04 | 0.7 | 0.057 | III | 10 |
| Jacket with hood and trousers, both with one-layer interliner, cotton | N-2;D-1 | med.-reg. | 9.11 | 0.345 | 0.7 | 0.493 | II | 7 |
| Fiberglas lined jacket and trousers | QM | med.-reg. | | | 0.7 | | II | 6 |
| Jacket with hood and trousers, both with two-layer cotton waffle weave interliner | N-2;D-1 | med.-reg. | | | 0.7 | | II | 7 |
| Blue serge 40-60 orlon- wool shirt and trousers | A-1;E-1 | med.-reg. | | | 0.8 | | III | 10 |
| Blue serge 40-60 dacron- wool shirt and trousers | A-1;E-1 | med.-reg. | | | 0.8 | | III | 10 |
| Fiberglas lined sport jacket and gabardine trousers | Stanley, E-1 | med.-reg. | | | 0.8 | | II | 9 |
| Navy flight jacket and trousers | A-2;A-54 | med.-reg. | 7.54 | 0.205 | 1.0 | 0.205 | V | 18 |
| OD heavy wool knit shirt and gabardine trousers | A-1;E-1 | med.-reg. | | | 1.1 | | II | 5 |
| Submarine jacket and trousers | Navy | med.-large | | | 1.1 | | II | 5 |
| Jacket and trousers for intermediate cold weather | Navy | medium | 5.21 | 0.21 | 1.1 | 0.191 | V | 16 |
| Fiberglas lined parka and trousers | QM | med.-reg. | | | 1.2 | | II | 8 |
| Field jacket and cotton trousers | | small | | 0.115 | 1.2 | 0.096 | IV | 15 |
| Navy jacket and trousers | A-1;X-54 | med.-reg. | 6.21 | 0.20 | 1.2 | 0.167 | V | 24 |
| Navy dark green flying suit | | med.-reg. | 3.82 | 0.18 | 1.2 | 0.150 | V | 30 |
| Experimental polyurethane jacket and heavy trousers | MA-1;D-1A | med.-reg. | 7.59 | | 1.3 | | V | 30 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE PART | PAGE |
|---|-------------------|------------|--------|-----------|-----------------|--------------|-------------------|------|
| | | | LBS. | IN. | CLO | | | |
| Nylon-dacron frieze shirt and trousers | N-2A;D-1A | large-reg. | | 0.40 | 1.4 | 0.286 | III | 14 |
| Flying jacket and trou- sers | B-15C; | med.-reg. | | 0.23 | 1.4 | 0.164 | III | 14 |
| Navy jacket and trousers | AL-1;WL-1 | large | | | 1.4 | | II | 6 |
| Navy winter flying suit | MIL-3- 18 342A | med.-reg. | 4.51 | 0.19 | 1.4 | 0.136 | V | 31 |
| Alpaca wool flying suit | B-48-A | med.-reg. | | | 1.5 | | I | 9 |
| (9) SPECIAL ITEMS | | | | | | | | |
| Two-piece Norwegian sur- vival kit insulation | | | | | 0.2 | | V | 33 |
| Flight jacket | A-2 | medium | | | 0.3 | | I | 9 |
| High altitude pressure suit | T-1 | medium | | | 0.3 | | IV | 8 |
| Ventilating garment | MA-1 | medium | | | 0.4 | | IV | 11 |
| Ventilating garment | MA-2 | medium | 2.93 | | 0.4 | | IV | 11 |
| Mock chenille spacer suit no sleeves | 1233-E | medium | | | 0.4 | | IV | 11 |
| "Jacket 1" of ground crew climatic cloth- ing assembly | | | 1.31 | 0.08 | 0.4 | 0.200 | V | 13 |
| "Jacket 2" of ground crew climatic clothing assembly | | | 1.71 | 0.12 | 0.4 | 0.300 | V | 16 |
| "Jacket 3" of ground crew climatic clothing assembly | | | 1.38 | 0.07 | 0.4 | 0.175 | V | 22 |
| Neoprene coated nylon barrier suit | | medium | | | 0.5 | | II | 7 |
| Light jacket (L.W.Foster) | LW-2 | | 1.59 | 0.17 | 0.5 | 0.340 | V | 15 |
| Modified "Jacket 2" of ground crew climatic clothing assembly | | | 1.63 | 0.13 | 0.5 | 0.260 | V | 22 |
| Experimental jacket | XMA-1 | medium | 2.27 | 0.11 | 0.6 | 0.183 | V | 20 |
| Experimental polyurethane jacket, 3.3 oz. nylon lined | MA-1 DuPont | medium | 2.17 | 0.16 | 0.7 | 0.229 | V | 29 |
| Light jacket (L.W.Foster) | LW-2A | | 1.69 | 0.11 | 0.8 | 0.138 | V | 21 |
| Experimental Vibrafoam field jacket | U.S. Rubber | medium | 2.66 | 0.18 | 0.9 | 0.200 | V | 27 |
| Experimental InsulAir jacket | U.S. Rubber | medium | 3.91 | 0.19 | 0.9 | 0.211 | V | 28 |
| Experimental polyurethane nylon-wool lined jacket | MA-1 DuPont | | 2.46 | 0.21 | 0.9 | 0.233 | V | 27 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE ENT PAGE |
|--|------------|-------------|--------|-----------|-----------------|--------------|-----------------------|
| | | | LBS. | IN. | GLO | | |
| winter overcoat | Commercial | medium | | | 1.0 | | IV 15 |
| Standard field jacket with buttoned-in wool pile liner | | medium | 4.54 | 0.30 | 1.0 | 0.300 | V 29 |
| Experimental jacket with buttoned-in polyure- thane liner | MA-1 | medium | | | 1.2 | | V 30 |
| Parachute canopy | | | | | 1.2 | | V 40 |
| Experimental sealed insulation full pressure suit | CSU-5/P | | | | 1.3 | | V 13 |
| Get-me-down pressure suit | CSU-4/P | | | | 1.3 | | V 14 |
| (10) SLEEPING BAGS | | | | | | | |
| Sleeping bag-life raft combination | Model 1 | | | | 0.4 | | IV 26 |
| Sleeping bag-life raft combination | Irving | | | | 0.7 | | V 40 |
| Sleeping bag-life raft combination | Model 2 | | | | 1.5 | | IV 26 |
| (11) HEADGEAR | | | | | | | |
| Summer flying helmet, cotton twill | AN-H-15 | medium | | | 0.1 | | IV 29 |
| Flying helmet, leather | A-11 | medium | | | 0.2 | | IV 29 |
| Outer hood for MD-1 | | medium | | | 0.3 | | IV 29 |
| Flying helmet, leather shearling, intermedi- ate zone type | A-11 | large | | | 0.4 | | IV 29 |
| Wool knit toque | Navy | medium | | | 0.4 | | IV 29 |
| Flight helmet, leather sheepskin | A-13 | extra large | | | 0.4 | | IV 30 |
| Outer hood, Terry cloth, rocket fuel handler | | medium | | | 0.4 | | IV 30 |
| Inner hood for MD-1 | | medium | | | 0.5 | | IV 30 |
| Khaki sun helmet, rigid fiber covered with cotton twill | | medium | | | 0.6 | | IV 30 |
| Outer and inner hood for MD-1 | | medium | | | 0.7 | | IV 30 |
| Flying helmet, leather shearling, winter wear | AN-H-16 | medium | | | 0.7 | | IV 31 |
| Flight helmet | P-1 | large | | | 0.7 | | IV 31 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE BRT PAGE |
|---|------------------|--------|--------|-----------|-----------------|--------------|-----------------------|
| | | | LBS. | IN. | | | |
| Helmet, aircrew, winter wear | B-9 | medium | | | 0.8 | IV | 31 |
| Inner vinyl hood for rocket fuel handler | | medium | | | 0.8 | IV | 31 |
| Flight helmet | A-4 | large | | | 0.8 | IV | 31 |
| Firefighters protective hood | A-1 | medium | | | 1.4 | IV | 32 |
| (12) GLOVES | | | | | | | |
| Leather gloves | B-3A | medium | | | 0.2 | IV | 32 |
| Very light flying gloves, mosquito resistant | K-1 | medium | | | 0.2 | IV | 33 |
| Glove insert, 75-25 wool-nylon | | medium | | | 0.2 | IV | 33 |
| Rayon insert, brown | | medium | | | | | |
| Inner rubber glove | MC-2 | medium | | | 0.2 | V | 43 |
| Navy four finger glove | A461-1 | medium | | | 0.2 | V | 43 |
| Glove set: wool insert, sheepskin glove | MA-1 | medium | | | 0.3 | IV | 33 |
| Wool glove insert, olive drab | | medium | | | 0.3 | IV | 34 |
| Flying gloves for anti-exposure suit | F-1 | medium | | | 0.3 | IV | 34 |
| Brown leather glove | MC-123 | medium | | | 0.3 | V | 43 |
| Gray wool glove | Fotiaire | | | | | | |
| | #8, new pattern | medium | | | 0.3 | V | 44 |
| Glove assembly | MA-1 | medium | | | 0.3 | V | 44 |
| Wool lined leather glove (industrial purpose) | | | 1.16 | | 0.6 | V | 46 |
| Leather flying gloves, wool insulation, rubberized fabric gauntlets | Robins | | | | 1.1 | V | 50 |
| (13) MITTENS | | | | | | | |
| Insert, horsehide | N-2 | medium | | | 0.3 | IV | 34 |
| Insert, wool knit, brown | | medium | | | 0.3 | IV | 34 |
| Insert, aircrew, blue | N-3A | medium | | | 0.4 | IV | 35 |
| Inflatable mitten, not inflated | | medium | | | 0.4 | IV | 35 |
| Mitten set: brown wool insert, leather mitten | MA-1 | medium | | | 0.4 | IV | 35 |
| One-finger mitten, leather, chamois lined | Fotiaire | medium | | | 0.4 | V | 44 |
| | #10, new pattern | | | | | | |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- LATION | T/I RATIO | REFERENCE PART PAGE |
|--|-----------------------------------|--------|--------|-----------|-----------------|--------------|------------------------|
| | | | LB. | IN. | CM | | |
| One-finger mitten, aluminized fabric (asbestos) | Fotiaire #9, new pattern JM | medium | | | 0.4 | V | 44 |
| One-finger mitten, leather, Byrd cloth insulated | Fotiaire #5, new pattern | medium | | | 0.4 | V | 44 |
| One-finger mitten, leather, insulation; 2-glass cloth, 1-rubber layer, not inflated | Fotiaire #6, old pattern | | | | 0.4 | V | 45 |
| One-finger mitten, leather, insulation: 2-Byrd cloth, 1 rubber layer | Fotiaire #1, new pattern | medium | | | 0.5 | V | 45 |
| One-finger mitten, leather, 2 aluminized rayon, 1 rubber layer | Fotiaire #3, new pattern | medium | | | 0.5 | V | 45 |
| Mitten set: brown wool insert, nylon mitten | N-4A | medium | | | 0.6 | IV | 36 |
| Experimental mitten set: brown wool insert, leather mitten (MA-1), experimental exposure suit mitten | | medium | | | 0.6 | IV | 36 |
| One-finger mitten, leather, insulation: 2 aluminized rayon, 1 rubber layer inflated and not in- flated | Fotiaire #7, new pattern | medium | | | 0.6 | V | 46 |
| Anti-contact mitten | Navy | medium | | | 0.6 | V | 46 |
| One-finger mitten, leather, insulation: 2 glass cloth, 1 rubber layer, partially inflated | Fotiaire #6, old pattern | medium | | | 0.6 | V | 45 |
| One-finger mitten, leather, insulation: 1 Byrd cloth, 1 aluminized rayon, 1 rubber layer | Fotiaire #2 new pattern | medium | | | 0.6 | V | 47 |
| One-finger mitten, leather | Fotiaire #9a, new pattern | medium | | | 0.6 | V | 47 |
| Down filled mitten for encapsulated clothing | Style II, Model I | | 0.32 | | 0.6 | V | 46 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSU- T/I | REFERENCE |
|---|------------------|--------|--------|-----------|------------------|-----------|
| | | | LBS. | IN. | LATION RATIO CLO | |
| Experimental, down-filled mitten for encapsulated seat survival clothing | | | | | 0.6 | V 48 |
| Mitten set, arctic wear | | medium | | | 0.7 | IV 37 |
| One finger mitten, leather, insulation: Fotiaire | | | | | | |
| 2 Sunbak cloth, 1 #8a, new pattern | | medium | | | 0.7 | V 47 |
| rubber layer | | | | | | |
| Experimental heavy mitten | N-4B | medium | | | 0.9 | IV 37 |
| Standard AF assembly: wool knit glove, leather shell A-11a, inner blue mitten, outer leather mitten | N-4 | medium | | | 0.9 | V 48 |
| Anti-exposure suit mitten with wool insert for air-inflatable anti-exposure suit | | | | | 0.9 | V 48 |
| Arctic mitten with OD wool glove insert | | medium | | | 1.0 | IV 38 |
| Standard mitten for MD-1 (wool insert, nylon-neoprene inter mitten) | | medium | | | 1.0 | IV 38 |
| Experimental down-filled mitten | | medium | | | 1.0 | V 49 |
| Experimental curved one-finger, bristolite sealed mitten | Type 2 | medium | | | 1.1 | V 49 |
| Down-filled mitten for encapsulated clothing | Style 1 Model II | | 0.27 | | 1.1 | V 49 |
| Anti-exposure suit mitten, spacer insulated, attached to air-inflatable anti-exposure suit MD-2 | | | | | 1.1 | V 49 |
| (14) SOCKS | | | | | | |
| Black light weight ribbed cotton socks | | medium | | | 0.3 | IV 38 |
| Experimental lambskin socks | | medium | | | 0.3 | III 25 |
| Light weight wool knit socks | | medium | | | 0.3 | IV 29 |
| Medium weight wool knit socks | | medium | | | 0.3 | IV 29 |

| DESCRIPTION | TYPE | SIZE | WEIGHT LBS. | THICKNESS IN. | INSU- LATION CLO | T/I RATIO | REFERENCE PART | PAGE |
|--|---------------|--------|----------------|------------------|------------------------|--------------|-------------------|------|
| Heavyweight wool knit socks | | medium | | | 0.4 | IV | 44 | |
| 25-75 cotton-wool socks | | medium | | | 0.5 | IV | 39 | |
| 100% wool socks with pull strap (wool felt duffel) | | medium | | | 0.9 | IV | 42 | |
| (15) SHOES | | | | | | | | |
| High rubber overshoe | MC-1 | medium | | | 0.3 | IV | 41 | |
| Black dress shoe, Oxford | | medium | | | 0.3 | IV | 40 | |
| Black GI service shoe, ankle height, for WD-1 use | | medium | | | 0.3 | IV | 39 | |
| Intermediate flying shoe | A-17 | medium | | | 0.3 | III | 26 | |
| Black leather service shoe | | medium | | | 0.4 | IV | 40 | |
| Intermediate flying shoe | Hood A-17 | medium | | | 0.5 | III | 27 | |
| High rubber overshoe | N-2 | medium | | | 0.7 | IV | 41 | |
| (16) BOOTS | | | | | | | | |
| Experimental, sealed insulation, leather boot | | medium | | | 0.2 | V | 50 | |
| Combat boot, leather, flying | MIL 13-11077A | medium | | | 0.2 | V | 51 | |
| Flight alert boot | | medium | | | 0.3 | V | 50 | |
| Felt alert boot | Chippewa | | | | 0.3 | V | 51 | |
| Experimental alert flight boot, full leather sole with patch of rubber cemented to outside sole | | medium | | | 0.4 | V | 50 | |
| Experimental alert flight boot, leather mid sole and full composition rubber and cord inter sole | | medium | | | 0.4 | V | 50 | |
| Experimental alert flight boot, leather mid sole and synthetic sponge rubber outer sole | | medium | | | 0.4 | V | 51 | |
| Experimental flying boot | Dahner | medium | | | 0.4 | V | 51 | |
| Zipper laced flying boot | MC-2 | medium | | | 0.4 | V | 51 | |
| Flying boot with Saran spacer | A-17 | medium | | | 0.5 | III | 27 | |
| Men's mukluk | N-1B | medium | | | 0.5 | IV | 42 | |
| Men's mukluk, survival | | medium | | | 0.5 | IV | 43 | |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSULA- TION | T/I RATIO | REFERENCE PART PAGE |
|---|-------------------|--------|--------|-----------|-----------------|--------------|------------------------|
| | | | LBS. | IN. | CLO | | |
| Flying boot without saran spacer | A-17 | medium | | | 0.6 | | III 27,28 |
| Sealed insulation boot | Hood 3 | medium | | | 0.7 | | III 28 |
| Standard heavy flying boot | A-17 | medium | | | 0.8 | | IV 41 |
| Experimental flying boot, Insulite, wool felt mid sole | A -17 | medium | | | 1.0 | | IV 42 |
| Bristolite boot | | medium | | | 1.0 | | IV 45 |
| Standard wool pile insulated flying boot, cork-rubber mid sole | A-17 | medium | | | 1.1 | | IV 43 |
| White rubber boots | Hood | | | | 1.4 | | V 52 |
| Down filled boot for encapsulated clothing | Style II Model | | 1.42 | | 1.5 | | V 52 |

B. MEDIUM (BODY) CLOTHING (1.5-3.0 clo)

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSULA- TION | T/I RATIO | REFERENCE PART PAGE |
|--|---------|---------|--------|-----------|-----------------|--------------|------------------------|
| | | | LBS. | IN. | CLO | | |
| (1) UNDERWEAR | | | | | | | |
| One-piece cellular vinyl sponge coldbar suit | WCRDC | medium | | | 1.5 | | IV 10 |
| Two-piece coldbar suit | T-53 | med-reg | | | 1.8 | | IV 12 |
| (2) ANTI-EXPOSURE SUITS | | | | | | | |
| Experimental anti- exposure suit | Clark | medium | | | 1.7 | | IV 15 |
| Anti-exposure suit with spacer | AML | medium | | | 1.9 | | IV 18 |
| without spacer | AML | medium | | | 2.0 | | IV 20 |
| Outer impermeable suit | AML-DL | medium | | | 2.0 | | III 15 |
| Sealed insulation suit, front zipper | | medium | | | 2.3 | | III 12 |
| (3) LINERS | | | | | | | |
| One-piece polyurethane liner | Convair | medium | | 0.27 | 1.6 | 0.169 | V 14 |
| "Eskimo Brand", two- piece liner | Brooks | med-reg | 3.42 | 0.36 | 1.6 | 0.225 | V 25 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSULA- TION | T/I RATIO | REFERENCE PART | PAGE |
|--|-------------------|----------|--------|-----------|-----------------|--------------|-------------------|------|
| | | | LBS. | IN. | CLG | | | |
| "Winterseal" two-piece liner | Refrigiwear | med-reg | 2.31 | 0.275 | 1.6 | 0.172 | V | 25 |
| "Dutchess" Flite wear | Dutchess T-500 | medium | 1.87 | 0.185 | 1.6 | 0.116 | V | 25 |
| "Refrigiwear" jacket and trousers | Burnett | med-reg | | 0.285 | 1.7 | 0.168 | IV | 20 |
| Urethane plastic insulated jacket and trousers | USK-W-200 | medium | 1.99 | 0.295 | 1.7 | 0.174 | V | 26 |
| "Wunderwear" two-piece 100% dacron liner, 3X3 construction | Shelly | med-reg | 2.51 | 0.375 | 1.8 | 0.208 | V | 26 |
| Dacron insulated jacket and trousers | USK-W-200 | | | | 2.1 | | V | |
| "Wunderwear" two-piece 100% dacron liner, 4X4 construction | Shelly | med-reg | 2.90 | 0.48 | 2.4 | 0.200 | V | 35 |
| (4) ONE-PIECE COVERALLS | | | | | | | | |
| Experimental down-filled coverall | SAC | medium | 5.53 | 0.53 | 1.8 | 0.294 | V | 33 |
| Experimental rayon acetate coverall | MD-3A | med-reg. | 5.58 | 0.48 | 2.5 | 0.194 | V | 36 |
| (5) ONE-PIECE FLYING SUITS | | | | | | | | |
| Electrically heated flying suit | C-1 | medium | | | 1.6 | | II | 10 |
| Lightweight fiberglass flying suit | B-78 | medium | | | 2.0 | | III | 14 |
| Lightweight, quilted, milkweed filled flying suit | B-78 | medium | | | 2.1 | | III | 15 |
| Down-filled suit with hood, trousers | Hagan | | 7.10 | | 2.7 | | V | 34 |
| (6) TWO-PIECE FLYING SUITS | | | | | | | | |
| Alpaca wool flying jacket and trousers | B-15A-11 | med-reg | | 0.295 | 1.5 | 0.193 | I | 9 |
| Flying jacket and trousers | B-15B;A-11B | med-reg | | | 1.6 | | II | 6 |
| Flying jacket and trousers, thermal cloth interlined | B-15B;A-11B | med-reg | | | 1.6 | | I | 9 |
| Alpaca wool flying suit | B-48-A2 | med-reg | | | 1.6 | | I | 9 |

| DESCRIPTION | TYPE | SIZE | WEIGHT | THICKNESS | INSULA- TION | T/I RATIO | REFERENCE PART PAGE |
|--|------------------|-------------------|--------|-----------|-----------------|--------------|------------------------|
| | | | LBS. | IN. | CLO | | |
| Heavy flying jacket with hood and trousers, wool pile interlined | N-2;D-1 | large- regular | 7.11 | 0.345 | 1.6 | 0.216 | II 9,10 |
| Dynel batt jacket and trousers | U.S. Rubber | med-reg | | 0.24 | 1.6 | 0.150 | IV 20 |
| Heavy flight jacket and trousers | N-3;D-1 | med-reg | 10.75 | | 1.6 | | V |
| Jacket and trousers for extreme cold weather | Navy | | 8.63 | 0.34 | 1.6 | 0.213 | V 34 |
| Alpaca flying suit | B-48-A3 | med-reg | | | 1.7 | | I 9 |
| Unifoam (polyurethane) jacket and trousers | WCRDC | med-reg | | 0.285 | 1.7 | 0.168 | IV 21 |
| Leather shearling jacket and trousers | | med-reg | | | 1.7 | | I 9 |
| RCAF flying suit, jacket and trousers zipped together | RCAF ZONE VII | med-reg | 6.63 | 0.305 | 1.7 | 0.177 | V 31 |
| Flying jacket with hood and trousers | N-3;F-1 | med-reg | 9.45 | 0.315 | 1.8 | 0.175 | II 10,11,13 |
| Outer parka and trousers | QM | large-med | | | 1.9 | | II 12,13 |
| Heavy flying shirt and trousers | N-2;A-1 | large-med | | | 1.9 | | III 16 |
| Quilted parka and trousers | B-9;A-8 | med-reg | | | 1.9 | | I 10 |
| Field jacket and trousers | | large-reg | | | 1.9 | | IV 21 |
| Alpaca wool parka and trousers | B-11;A-10 | med-reg | | | 2.0 | | II 8 |
| Flying suit for use with MK-IV | Navy | med-reg | | 0.29 | 2.0 | 0.145 | IV 22 |
| Navy flying jacket and trousers with buttoned-in liner | A-1;X-54 | med-reg | 8.48 | 0.415 | 2.0 | 0.208 | V 28 |
| Woven urethane jacket and trousers (L.W. Foster) | M-3 | | 3.95 | 0.19 | 2.0 | 0.095 | V 30 |
| Heavy jacket and trousers (L.W. Foster) | H-3A | | 5.00 | 0.345 | 2.0 | 0.173 | V 33 |
| Navy flying jacket with hood and trousers | N-2A;D-1 | extra large | | 0.345 | 2.2 | 0.157 | III 17,18 |

| DESCRIPTION | TYPE | SIZE | WEIGHT LBS. | THICKNESS IN. | INSULA- TION CLO | T/I RATIO | REFERENCE PART PAGE |
|--|-------------------------------|-----------|----------------|------------------|------------------------|--------------|------------------------|
| Heavy aircrew jacket and trousers | N-3B;F-1B | large-reg | 9.45 | 0.315 | 2.4 | 0.131 | IV 24 |
| Experimental flying jacket and trousers 5/16" thick | N-2;D-1 | med-reg | 9.11 | 0.345 | 2.5 | 0.138 | V 36 |
| Heavy, white parka and trousers (L.W. Foster) | P-4 | | 6.63 | 0.37 | 2.5 | 0.148 | V 35 |
| Modified parka (#4) and trousers of ground crew climatic clothing | | | 6.11 | 0.30 | 2.5 | 0.120 | V 35 |
| Experimental polyure- thane field jacket and Type F-1 trousers | US Rubber Dayton Rubber | | | 0.38 | 2.7 | 0.141 | IV 24 |

(7) SPECIAL ITEMS

| | | | | | | | |
|--|----------------|-----------|------|-------|-----|-------|------|
| Fiberglas filled jacket | A-11 Drybak | large-reg | | | 1.7 | | II 7 |
| "Jacket 4" of ground crew climatic clothing, and trousers | | | 9.41 | 0.325 | 1.9 | 0.171 | V 37 |
| Modified (sealed insulation) Get-Me- Down pressure suit | CSU-5/P | | | | 2.0 | | V 21 |
| Experimental down- filled coat | Hagan | medium | 2.64 | 1.05 | 2.2 | 0.477 | V 39 |
| Experimental down- filled coat | Hagan | | 2.64 | 1.05 | 2.8 | 0.375 | V 39 |

| DESCRIPTION | TYPE | MANIKIN CLOTHING | WEIGHT OZ. | THICKNESS IN. | INSU- LATION CLO | T/I RATIO | REFERENCE PART PAGE |
|-------------|------|---------------------|---------------|------------------|------------------------|--------------|------------------------|
|-------------|------|---------------------|---------------|------------------|------------------------|--------------|------------------------|

(8) SLEEPING BAGS

| | | | | | | | |
|--|--------|----------------|----|--|-----|--|--------|
| Sleeping bag - life raft combination, General Tire and Rubber Co. | Ramat | none | | | 2.4 | | IV 27 |
| Casualty bag | QM | heavy assembly | | | 2.5 | | II 13 |
| Sleeping bag on A-3 mattress, fluffing 10 A | QM;M-1 | Heavy assembly | 52 | | 2.6 | | III 22 |
| Sleeping bag | QM;M-1 | heavy assembly | 52 | | 2.7 | | III 22 |

| DESCRIPTION | TYPE | MANIKIN CLOTHING | WEIGHT OZ. | THICKNESS IN. | INSULATION | T/I RATIO | REFERENCE PART PAGE |
|---|------------------|------------------|------------|---------------|------------|-----------|---------------------|
| CLO | | | | | | | |
| Experimental poly-urethane derivative filled sleeping bag | | underwear | | | 2.7 | | V 41 |
| Sleeping bag on A-3 mattress | QM;M-1 | underwear | 28 | | 2.8 | III | 20 |
| Sleeping bag, Thurstone liner, on A-3 mattress | QM;M-1 | underwear | 36 | | 2.9 | III | 20 |
| Sleeping bag - life raft combination, General Fire and Rubber Co. | Ramat | heavy assembly | | | 3.0 | IV | 28 |
| Sleeping bag on A-3 mattress | QM;M-1 | underwear | 52 | | 3.0 | III | 21 |
| Sleeping bag on A-3 mattress | AM;M-1 | underwear | 36 | | 3.0 | III | 20 |
| (9) HEADGEAR | | | LBS. | | | | |
| Down-filled detachable hood | | | | | 1.6 | V | 42 |
| Experimental flying helmet | MA-3 | | | | 2.2 | V | 42 |
| Flying helmet | MA-3 | | | | 2.5 | V | 42 |
| Flying helmet | MA-2 | | | | 2.7 | V | 42 |
| (10) BOOTS | | | | | | | |
| Down filled boot for encapsulated clothing | Style I Model II | | 1.1 | | 1.8 | V | 52 |
| Experimental down filled boot for encapsulated clothing | | | | | 1.9 | V | 52 |
| C. HEAVY (BODY) CLOTHING | | | | | | | |
| | | | SIZE | LBS. | | | |
| (1) TWO-PIECE FLYING SUITS | | | | | | | |
| Experimental one-piece down-filled suit (encapsulated clothing) | Style I Model II | | 2.60 | 0.72 | 3.0 | 0.186 | V 37 |
| Flying jacket (N-3) and trousers | Niemi | med-reg | 7.84 | 0.66 | 3.3 | 0.200 | V 39 |
| Experimental two-piece down-filled suit (encapsulated clothing) | Style II Model I | | 3.85 | 0.77 | 3.5 | 0.175 | V 38 |

| DESCRIPTION | TYPE | MANIKIN CLOTHING | WEIGHT OZ. | THICKNESS | INSU- LATION CLO | T/I RATIO | REFERENCE PART PAGE |
|--|--------------------|---------------------|---------------|-----------|------------------------|--------------|------------------------|
| (2) SLEEPING BAGS | | | | | | | |
| Sleeping bag on A-3 mattress | QM;M-1 | underwear | 44 | | 3.3 | III | 20 |
| Sleeping bag on A-3 mattress | Van Veen | underwear | 50 | | 3.4 | IV | 28 |
| Sleeping bag on A-3 mattress, fluffing 10 X | QM;M-1 | underwear | 52 | | 3.4 | III | 21 |
| Sleeping bag on A-3 mattress | QM;M-1 | underwear | 48 | | 3.4 | III | 21 |
| Sleeping bag | Van Veen | underwear | 50 | | 3.5 | IV | 28 |
| Experimental sleeping bag | 350in ³ | underwear | | | 3.5 | V | 41 |
| Sleeping bag, Thurstone liner, on A-3 mattress | QM;M-1 | underwear | 52 | | 3.8 | III | 21 |
| 100% down-filled sleeping bag (having been pressure packed) | MC-1 | | | | 3.8 | V | 41 |
| 100% down-filled sleeping bag | MC-1 | | | | 4.4 | V | 41 |
| Sleeping bag | QM;A-3 | heavy assembly | medium | | 7.0 | II | 14 |

SECTION 3

COMPARATIVE TECHNIQUES FOR MEASURING THERMAL INSULATION OF BODY CLOTHING

In part 4 of this series of thermal insulation of Air Force body clothing* (ref. 4) the individual values reported in the catalog were based either on separate measurements of the items, or were derived by a difference method for multilayered assemblies. Although this difference method yielded values which were reasonably reliable and representative of the clothing insulation as worn, the method is not devoid of error nor free of technical criticism. To determine the reliability of the values obtained by such a method we decided to compare the catalog value (or sum of values in case of multilayered assemblies) with the mean value actually obtained by total assembly measurements on the copper manikin. Results of this comparison for light, medium, and heavy insulative clothing assemblies are presented in figure 1. As indicated by the mean curve and degree of scatter of individual points, the values in general show reasonably good correlation between total assembly values obtained by the difference method and those determined with the total measurements. The results are based on 58 comparisons. Eleven tests were conducted with light insulative clothing; thirty tests with medium weight clothing and seventeen tests were conducted with heavy clothing. Greatest divergence from a linear relationship between measured vs calculated (catalog) values is indicated in the light clothing zone, with slight divergence also occurring in the heavy clothing range. Best correlation is obtained in the medium or intermediate weight clothing range. The relationship is illustrated in figure 2 where a similar correlation is shown in terms of the correction factors. In this graph the body insulation (I_b) in clo is first obtained by simple addition of the selected clothing values. This is then multiplied by the corresponding correction factor to yield a corrected or actual thermal insulation which would result if this particular assembly were tested on the copper manikin.

By using the above procedure, the catalog values will yield more accurate and quantitatively reliable predictions of human tolerance time for environmental exposures. For operational field use where insulative testing of protective clothing on physical models is not possible the recommended procedure for using these catalog values should prove practical and valuable.

* Body clothing includes insulation covering the arms, legs and trunk areas.

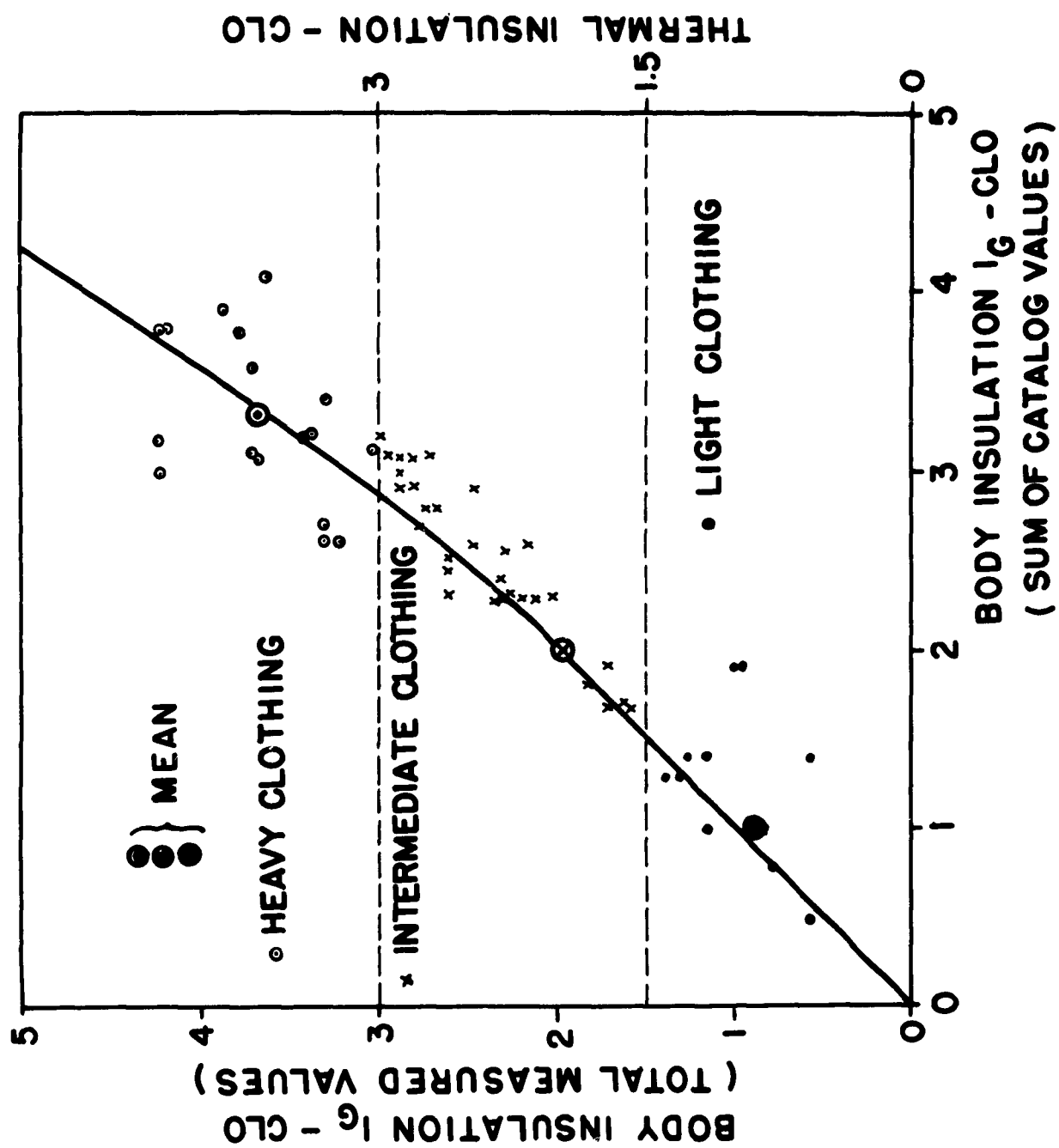


Figure 1. Measured versus Calculated Body Insulation Values

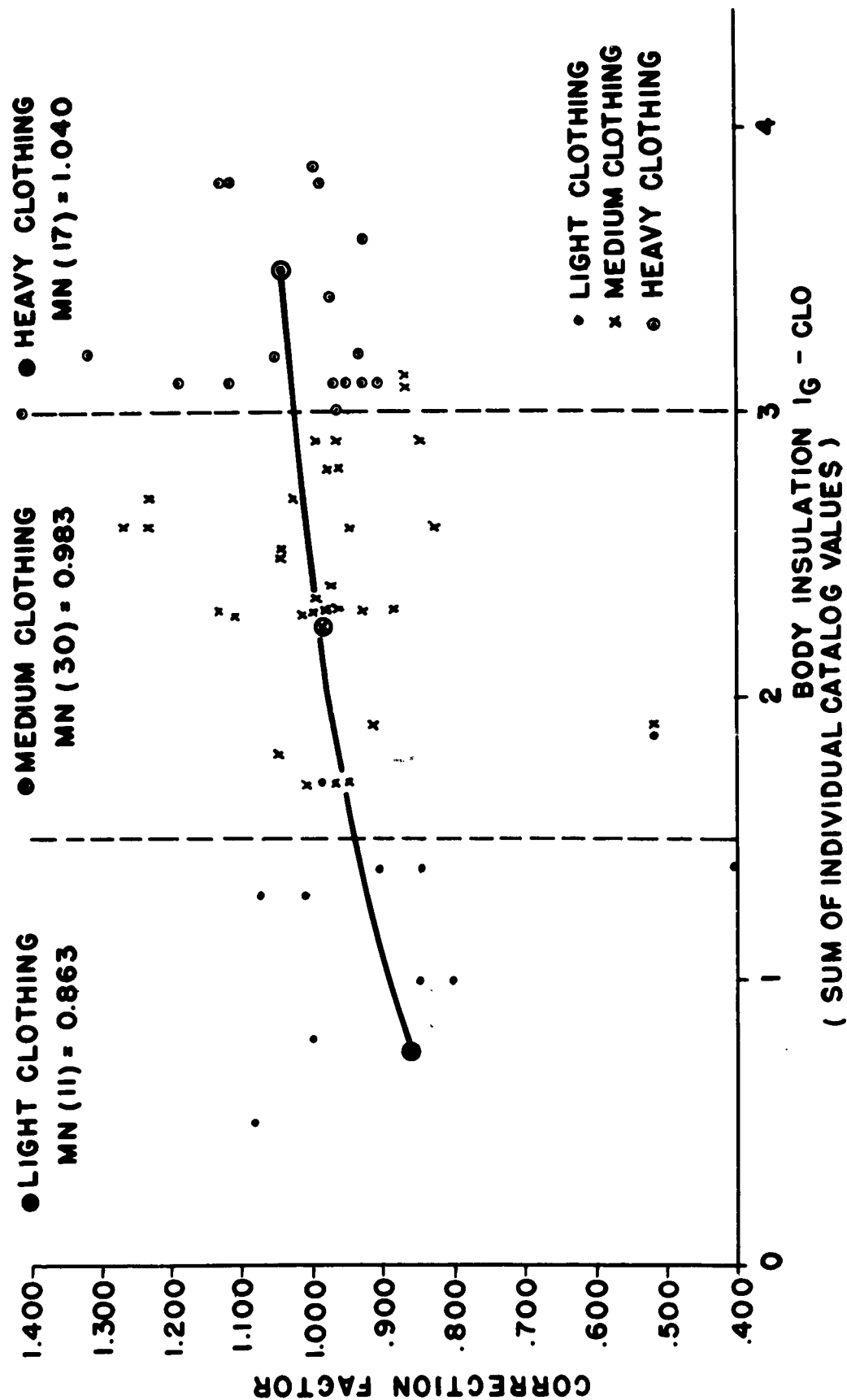


Figure 2. Correction Factors for Calculating Thermal Insulation of Body Clothing

SECTION 4

LAUNDERING EFFECTS ON CLOTHING INSULATION

Tests with a number of clothing items, particularly underwear, were carried out to study the effects of laundering on thermal insulation. The clo value of a new clothing item was determined in a test series on the copper manikin. Then, this item was laundered and dried ten times. In a second test series on the physical model, using approximately the same test conditions, the thermal insulation of the laundered clothing was determined and the result compared with that of the initial or unlaundered test series.

Except for a very few cases, where the laundering process may have loosened the insulating material, thus producing more insulating air space, laundering generally decreased the thermal insulation of clothing. Shrinkage of the material is possibly the main reason for this decrease. Shrinkage causes the clothing to fit tighter which, in turn, decreases the entrapped air layers between clothing and body surface, thus lowering the total insulation. In clothing with an insulating interlining, tight fit compresses the insulation material and thus eliminates a part of the small air spaces between the fibers of that material which again results in decreased insulation.

The fact that laundering also decreased thickness of most clothing items leads to the conclusion that washing also changes the physical characteristics of the material. We could not study these physical changes in detail, but we assume, depending on the type of material, the following changes may occur:

- (a) breakage of fibers in nonelastic materials;
- (b) shrinkage of individual fibers;
- (c) other changes in the fiber structure.

Figure 3 illustrates the insulation losses due to laundering various types of underwear. These are expressed in percent of the initial insulation value. Included below the blocks are brand names of the underwear and, above the blocks, the type of insulating material used. Three characteristic types of underwear can be distinguished:

- (a) items using synthetic material;
- (b) items using an insulating air layer between two layers of material;
- (c) single layer items.

Of the above three groups, single layer underwear is least affected by laundering (7.5%). Highest insulation loss was observed in the insulated, double-layer underwear (24.5%). When washing this type of underwear the air

layer is replaced by water. Apparently the two layers of material are not completely separated after drying, therefore, the insulating air layer is lost or only partially restored. Much individual variation in insulation loss was observed in the remaining group of clothing fabricated with synthetic insulation materials (4-33%). Dynel, dacron, bulk orlon and polyether urethane foam showed the least insulation losses. Furthermore, the type of insulation material, the way the clothing is constructed, and thickness of the insulation play roles in influencing the effects of laundering. For example, of the four dacron-insulated items in figure 3, two lost only 4%, the remaining two lost 14 and 16% respectively, of their initial thermal insulation.

LAUNDERING EFFECT ON CLOTHING INSULATION

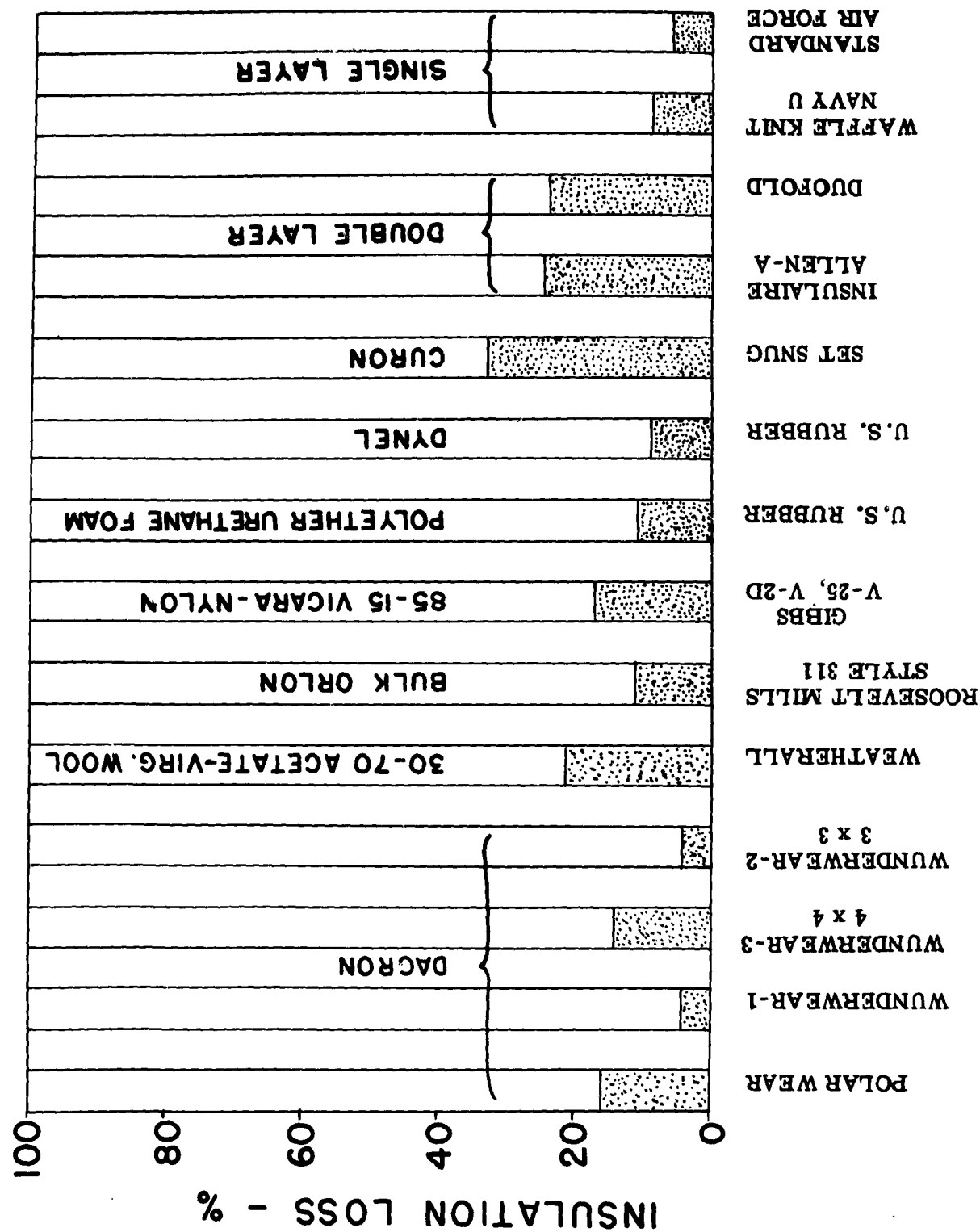


Figure 3. Laundering Effect on Clothing Insulation

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|---|---------------------|---|---------------------|
| <p>AD</p> <p>Wright Air Development Division, Aerospace Medical Division, Wright-Patterson Air Force Base, Ohio</p> <p>THERMAL INSULATION OF AIR FORCE CLOTHING, A CATALOG AND PART 5 OF A SERIES, by John F. Hall, Jr. and Johannes W. Polte. September 1960, 75 p. incl. illus. (Project 7164, Task 71830) (WADDTR 60-597).</p> <p>Unclassified Report</p> <p>Results of the fifth of a series of thermal insulation studies performed with electrically heated hand, foot, head, and entire body models are presented. The experimental data include results obtained with light, medium, and heavy clothing types, as well as with thermal protective items of specialized nature. A revised catalog listing individually the insulation in clo units of numerous</p> <p>(over)</p> | <p>UNCLASSIFIED</p> | <p>AD</p> <p>Wright Air Development Division, Aerospace Medical Division, Wright-Patterson Air Force Base, Ohio</p> <p>THERMAL INSULATION OF AIR FORCE CLOTHING, A CATALOG AND PART 5 OF A SERIES, by John F. Hall, Jr. and Johannes W. Polte. September 1960, 75 p. incl. illus. (Project 7164, Task 71830) (WADDTR 60-597).</p> <p>Unclassified Report</p> <p>Results of the fifth of a series of thermal insulation studies performed with electrically heated hand, foot, head, and entire body models are presented. The experimental data include results obtained with light, medium, and heavy clothing types, as well as with thermal protective items of specialized nature. A revised catalog listing individually the insulation in clo units of numerous</p> <p>(over)</p> | <p>UNCLASSIFIED</p> |
| <p>AD</p> <p>recently developed clothing items is included. These are arranged in order of increasing value in each clothing category (i.e., light, medium, and heavy). Since catalog values were obtained either by separate measurement, or by a difference method, these two techniques for body clothing insulation measurements are described. Advantages and limitations of each respective method are discussed. Relationship between the measured and calculated thermal insulation of clothing assemblies is shown graphically and correction factors for use with each category of cataloged clothing are graphed. The effect of laundering on thermal insulation of many recent Air Force clothing assemblies is illustrated and discussed.</p> | <p>UNCLASSIFIED</p> | <p>AD</p> <p>recently developed clothing items is included. These are arranged in order of increasing value in each clothing category (i.e., light, medium, and heavy). Since catalog values were obtained either by separate measurement, or by a difference method, these two techniques for body clothing insulation measurements are described. Advantages and limitations of each respective method are discussed. Relationship between the measured and calculated thermal insulation of clothing assemblies is shown graphically and correction factors for use with each category of cataloged clothing are graphed. The effect of laundering on thermal insulation of many recent Air Force clothing assemblies is illustrated and discussed.</p> | <p>UNCLASSIFIED</p> |
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